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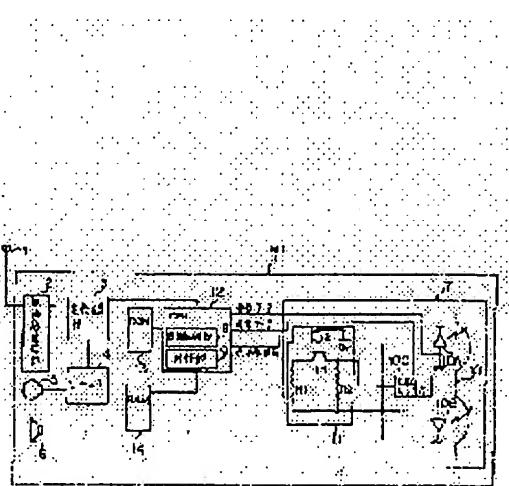
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(54) RADIO PORTABLE TERMINAL WITH INFRARED RAY COMMUNICATION FUNCTION AND INFRARED RAY LIGHT EMITTING POWER CONTROL METHOD BETWEEN RADIO PORTABLE TERMINAL WITH INFRARED RAY COMMUNICATION FUNCTION AND EQUIPMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To perform appropriate infrared ray light emitting power control even when a communication distance is changed and to lower the power consumption of infrared ray communication by recognizing an infrared ray communicating party relating to a radio portable terminal with an infrared ray communication function.

SOLUTION: This radio portable terminal MT is provided with an infrared ray communication part 7 for transmitting and receiving signals in the frequency band of an infrared region, a communicating party detection part 8



for detecting infrared ray communicating party information and a control part 9 for controlling light emitting power in the infrared ray communication part 7 corresponding to the information of the infrared ray communicating party detected in the communicating party detection part 8. Also, the communicating party detection means 8 detects the infrared ray communicating party information from data received from the infrared ray communicating party through the infrared ray communication part 7.

LEGAL STATUS

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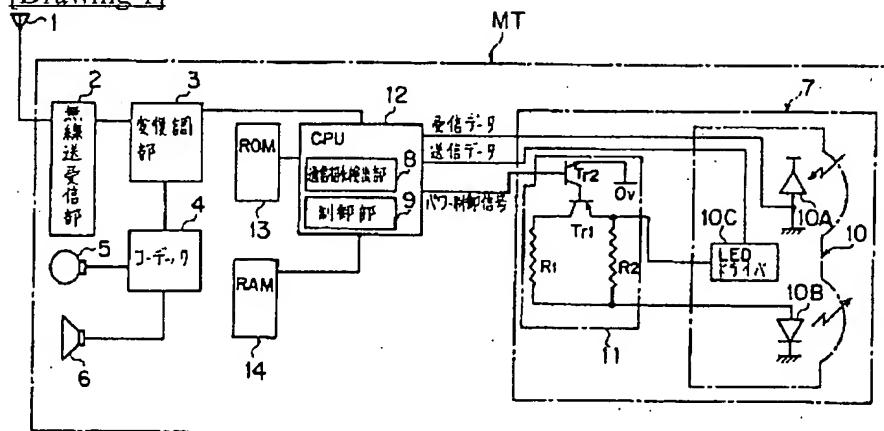
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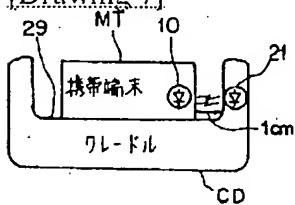
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DRAWINGS

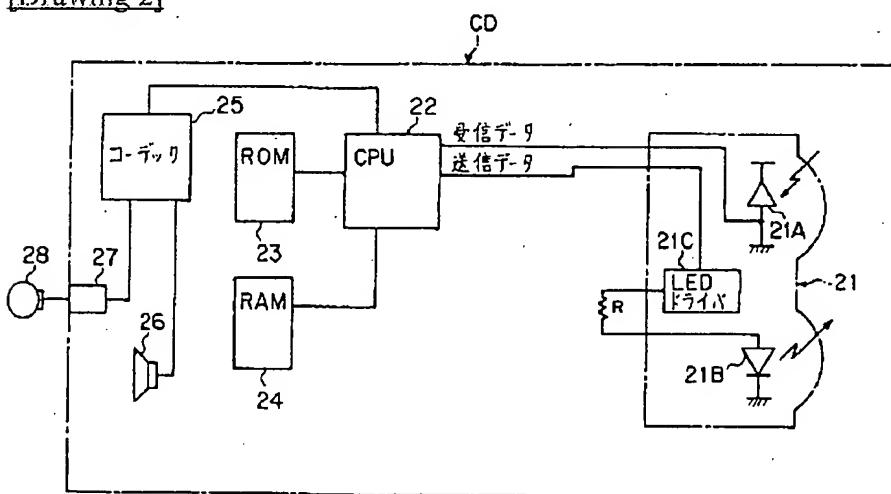
[Drawing 1]



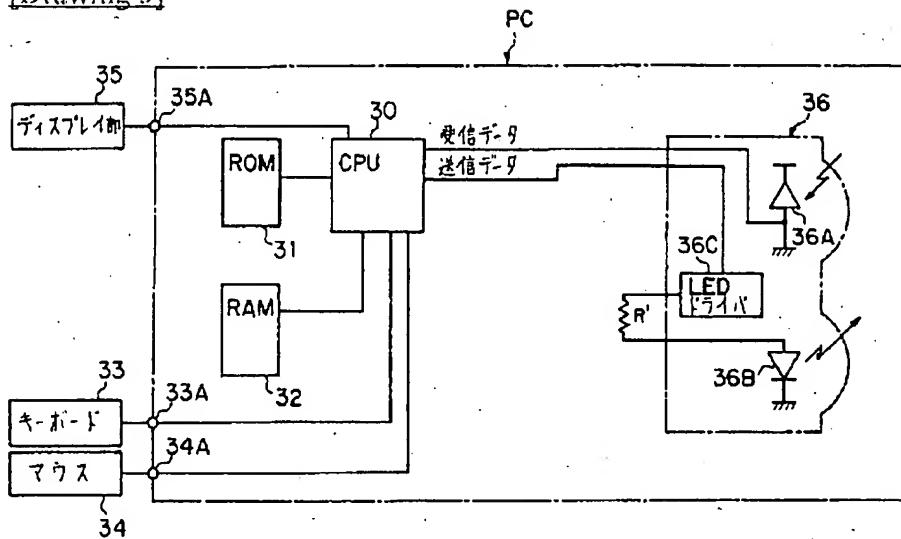
[Drawing 7]



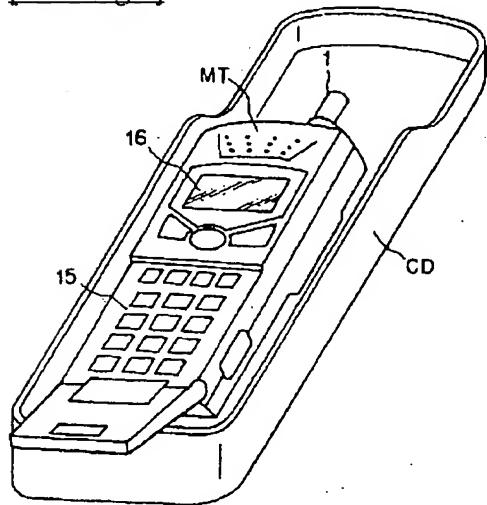
[Drawing 2]



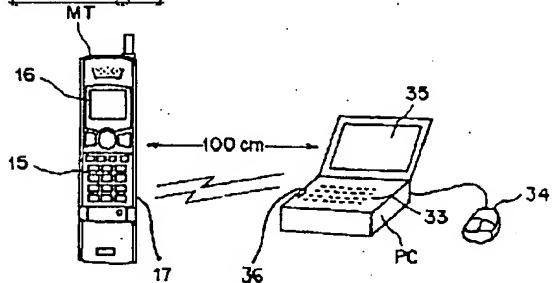
[Drawing 3]



[Drawing 6]

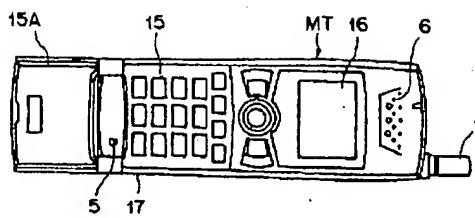


[Drawing 8]

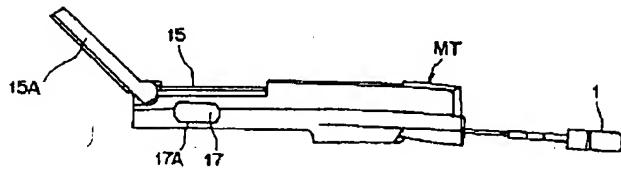


[Drawing 4]

(a)

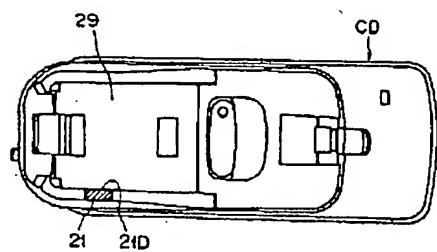


(b)

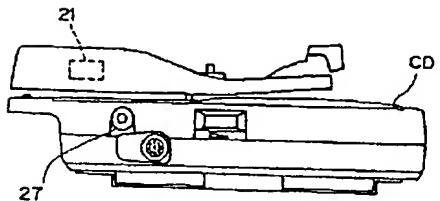


[Drawing 5]

(a)

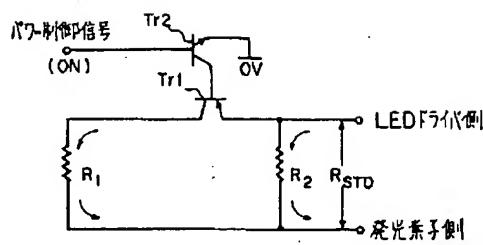


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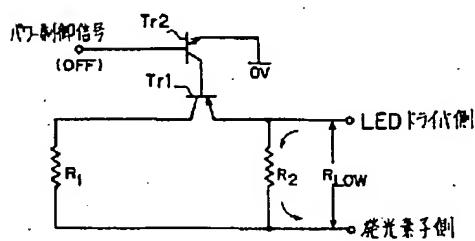


[Drawing 9]

(a)



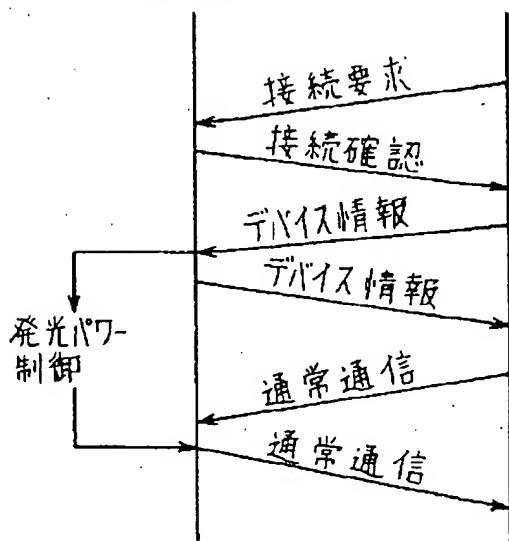
(b)



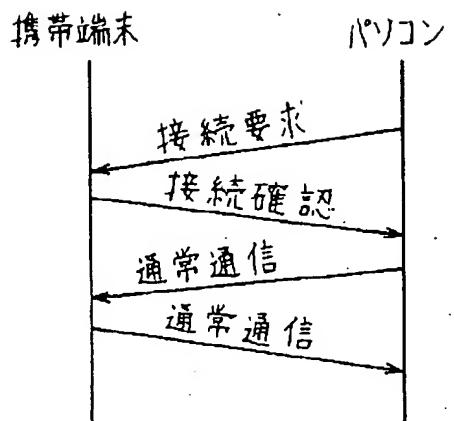
[Drawing 10]

携帯端末

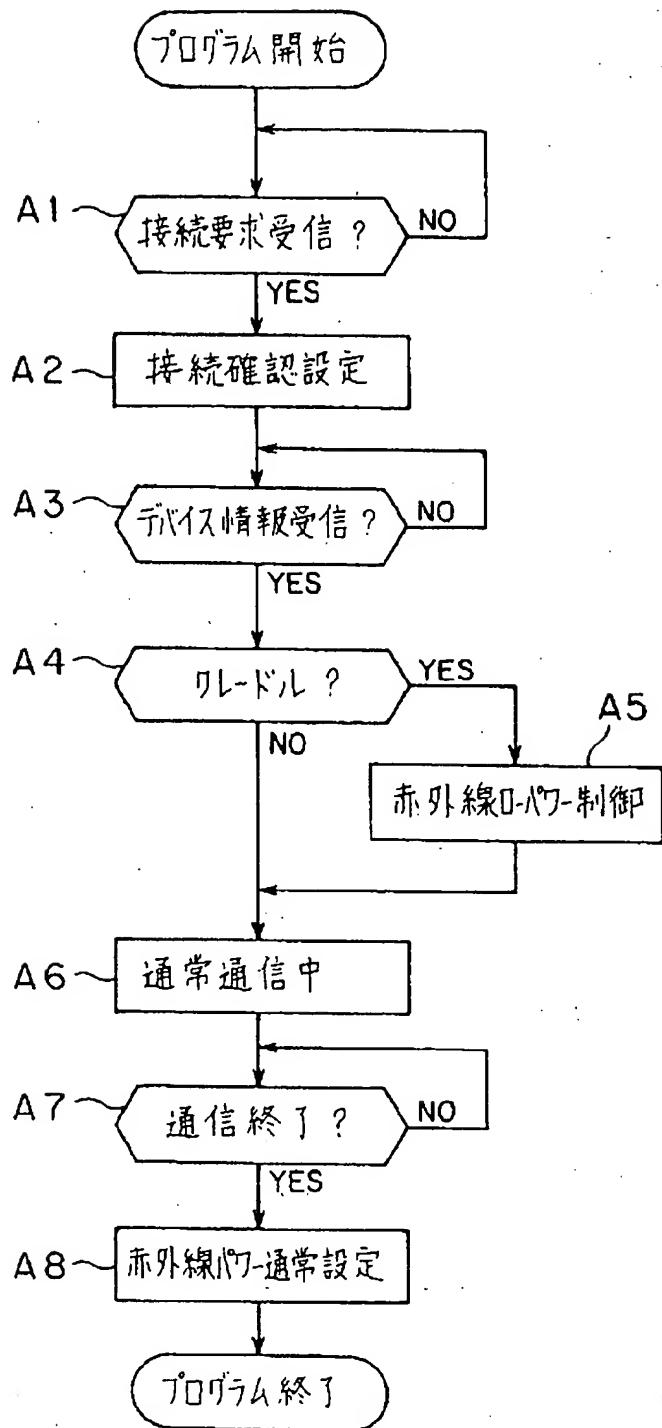
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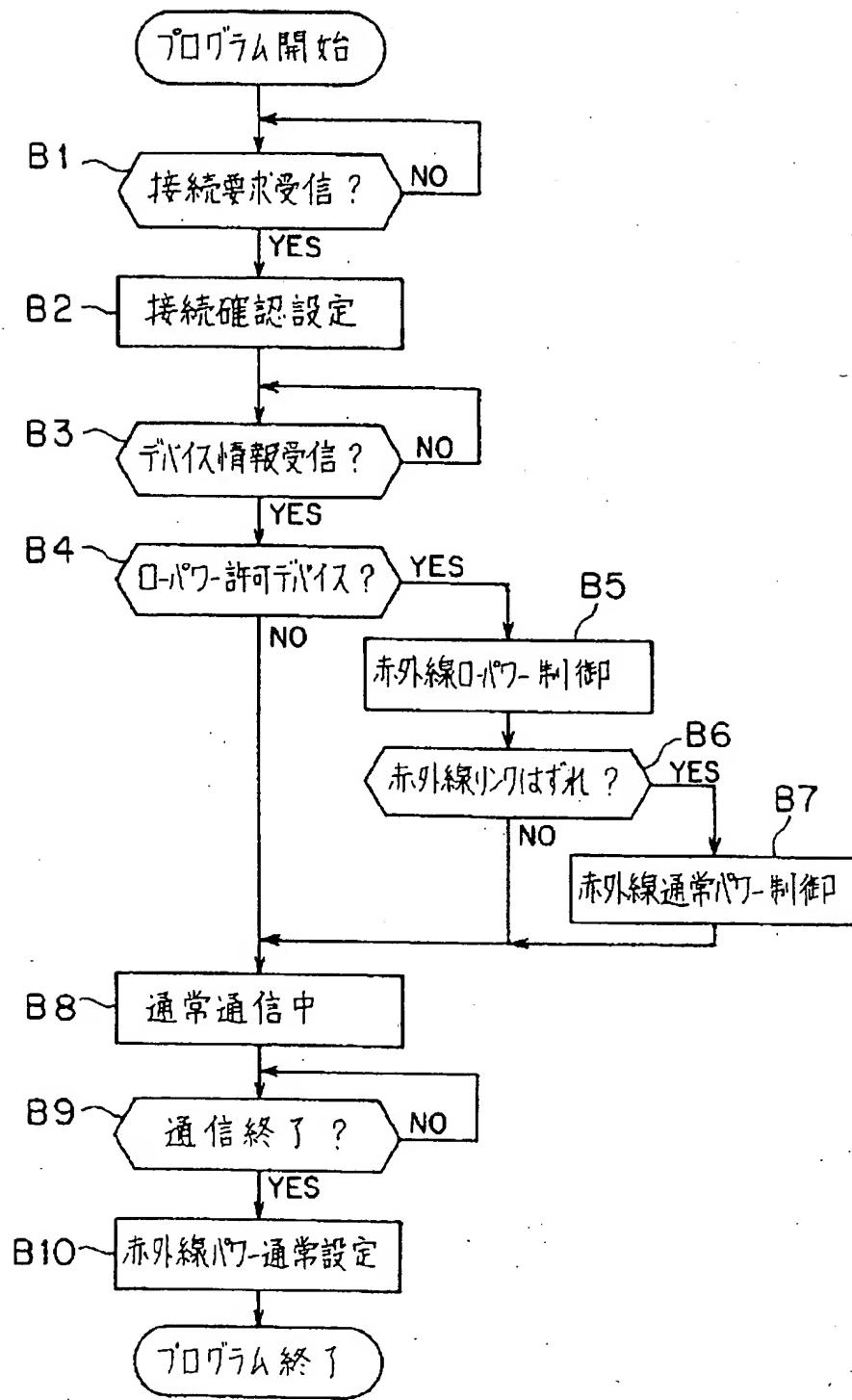
[Drawing 11]



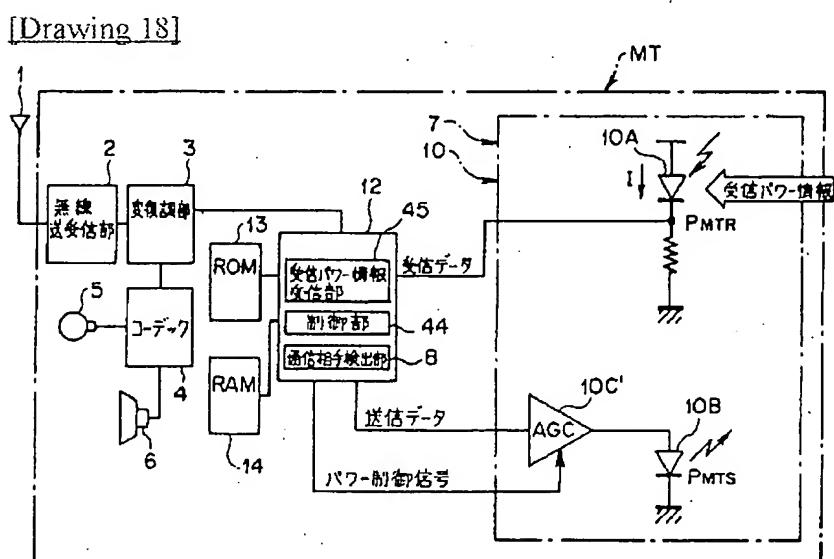
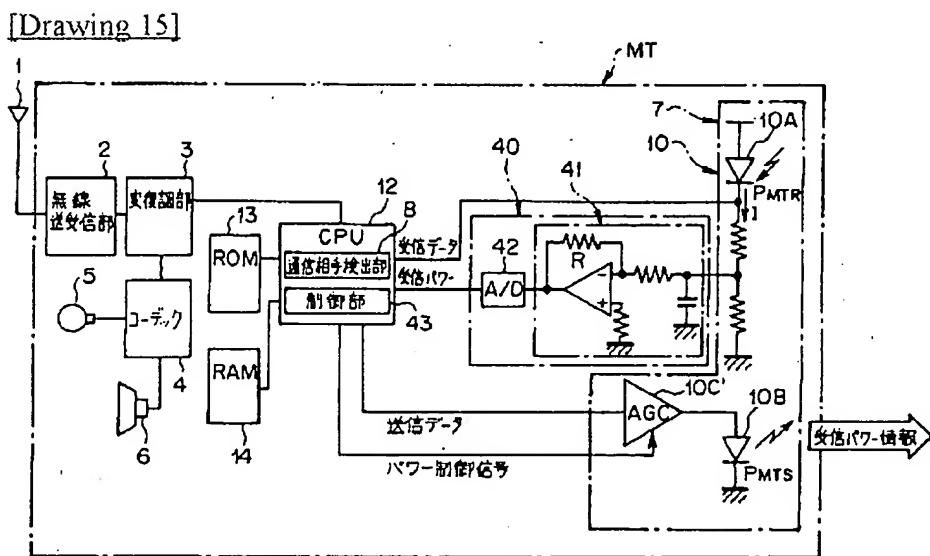
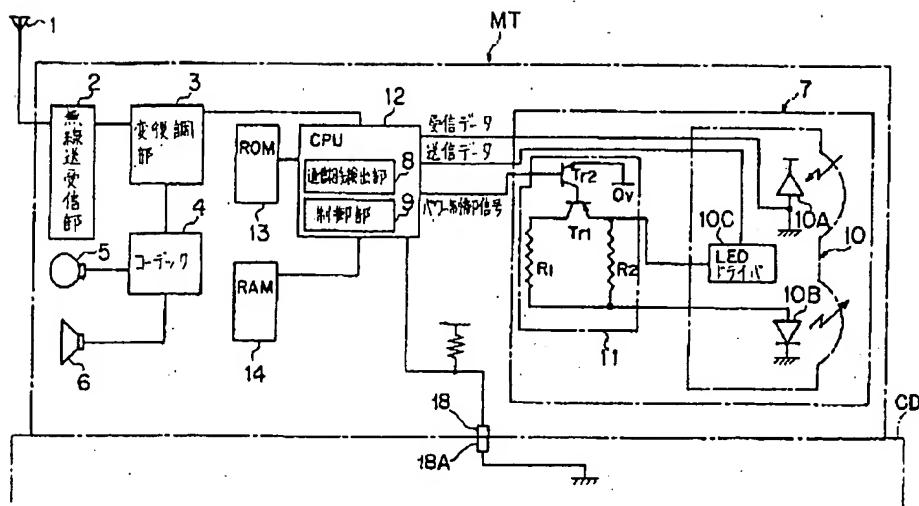
[Drawing 12]



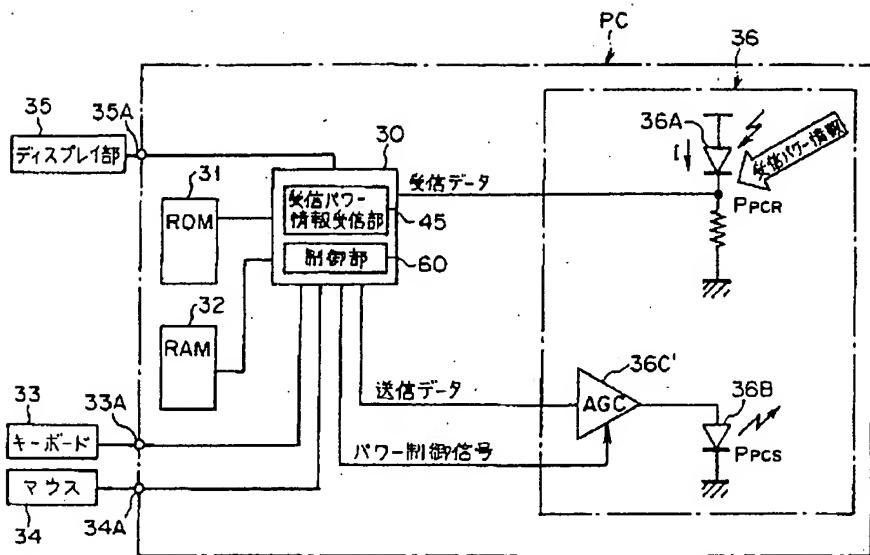
[Drawing 13]



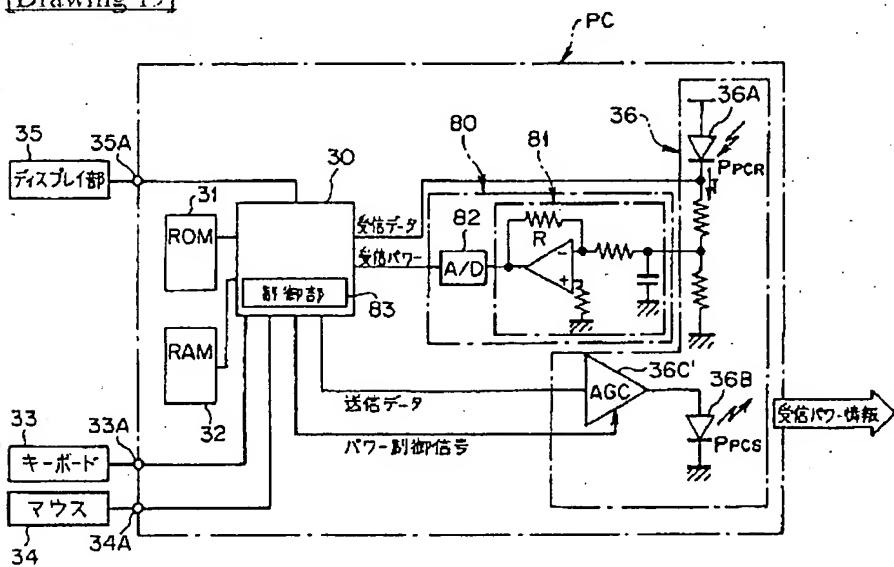
[Drawing 14]



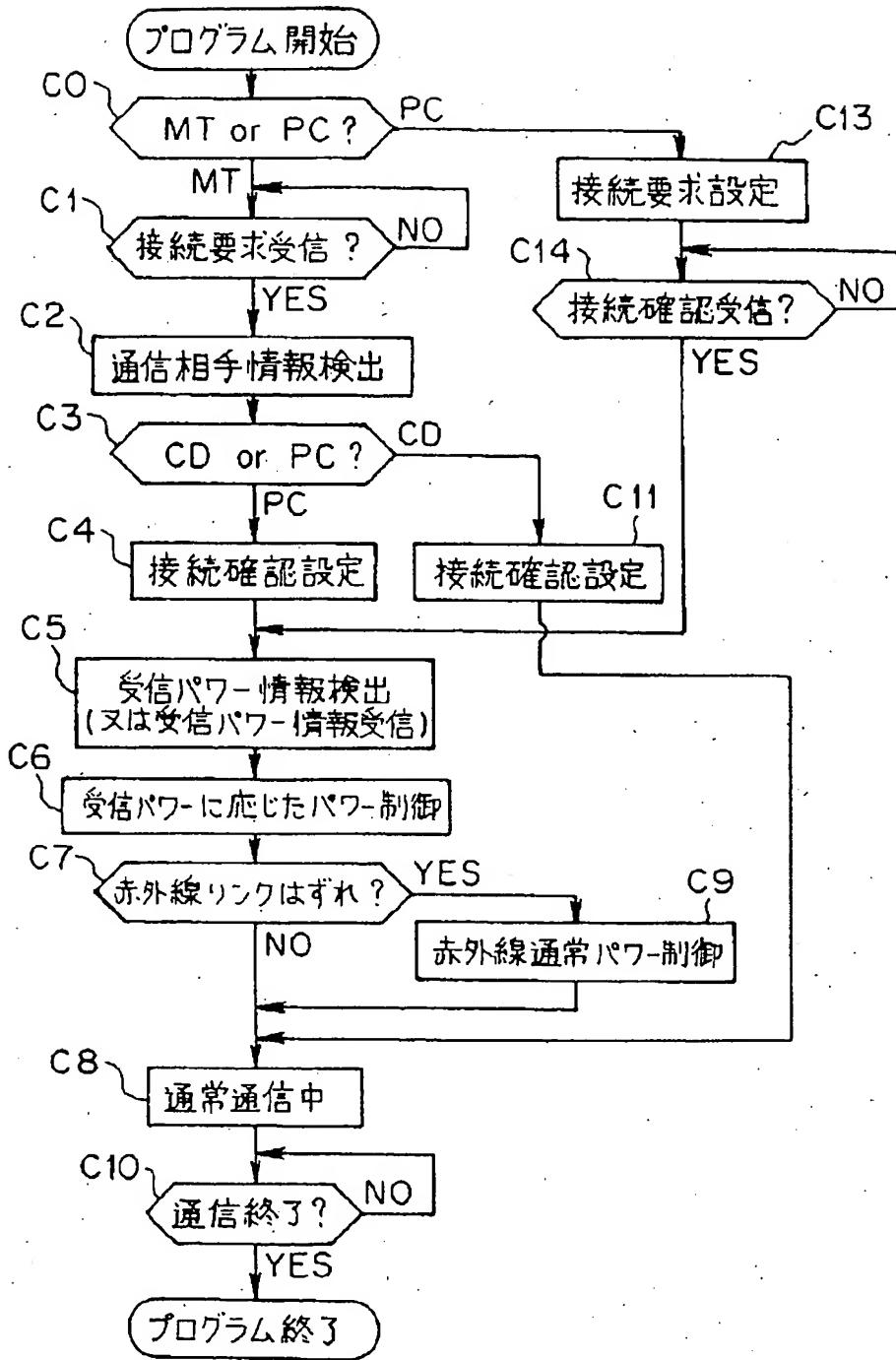
[Drawing 16]



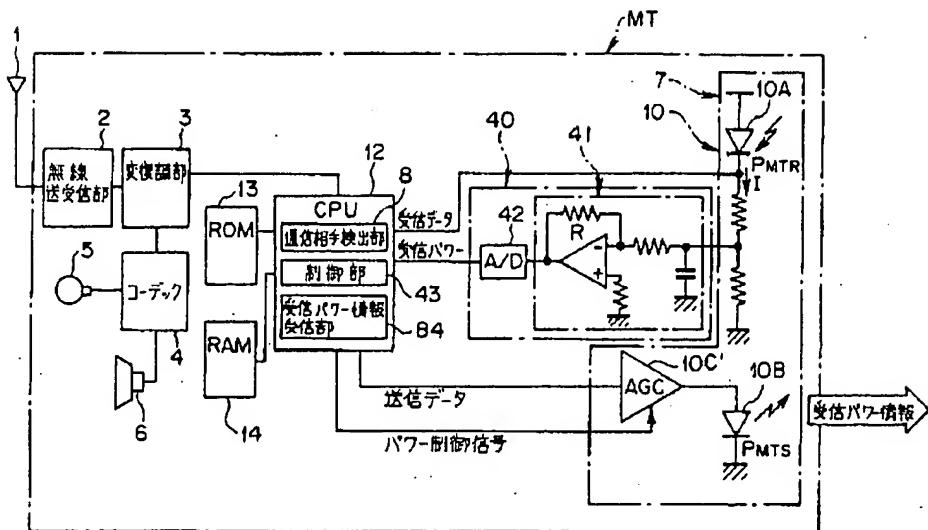
[Drawing 19]



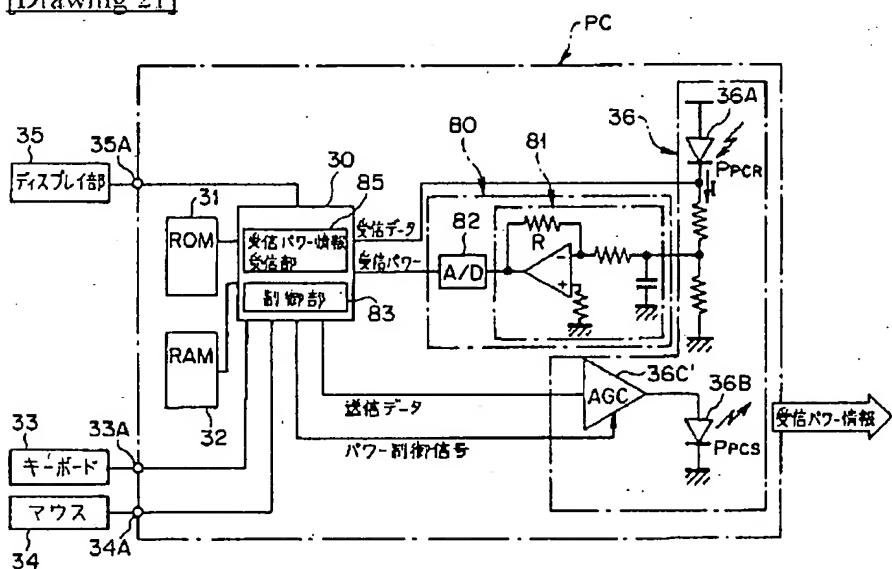
[Drawing 17]



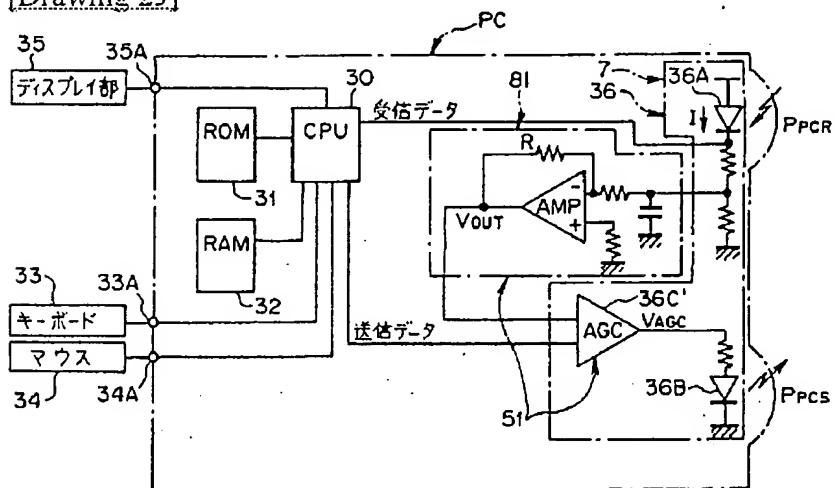
[Drawing 20]



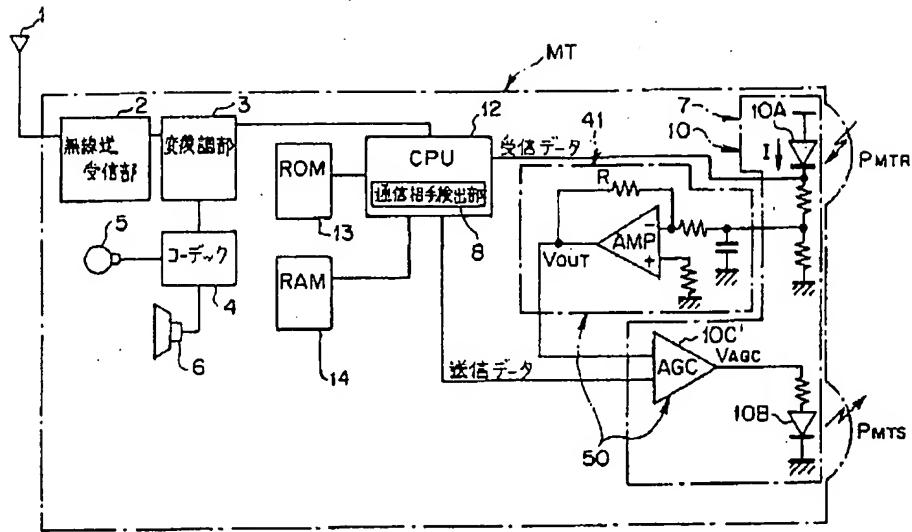
[Drawing 21]



[Drawing 22]



[Drawing 23]



[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001] (Table of contents)

Explanation of the gestalt and the 1st operation gestalt of implementation of technical problem The means for solving a technical problem invention which technical field Prior-art invention to which invention belongs tends to solve (drawing 1 -13)

- Explanation of the modification of the 1st operation gestalt (drawing 6 -9, 12-14)
- Explanation of the 2nd operation gestalt (drawing 2 , 4, 9, 15-17)
- Explanation of the modification of the 2nd operation gestalt (drawing 2 , 15-19)
- Explanation of the 3rd operation gestalt (drawing 2 , 4, 8, 20, 21)
- Explanation of the 4th operation gestalt (drawing 2 , 15-17, 19, 22, 23)
- In addition to this, it is effect-of-the-invention [0002].

[Field of the Invention] This invention relates to the infrared luminescence power control approach between a wireless personal digital assistant with infrared communication facility, a wireless personal digital assistant with infrared communication facility, and equipment. It considers that a wireless personal digital assistant uses the infrared ray communication which does not use a cable for the data communication in a comparatively near distance which diversification of the use gestalt is progressing, for example, is performed between [other than an original radio function] the terminals of a personal computer (henceforth a personal computer) etc. in recent years. Thus, the wireless personal digital assistant which has infrared communication facility in addition to an original radio function is called wireless personal digital assistant with infrared communication facility.

[0003]

[Description of the Prior Art] When such a wireless personal digital assistant with infrared communication facility keeps a comparatively near distance and performs data communication between the terminals of a personal computer etc., according to the specification of IrDA (Infrared Data Association), the communication range between the terminal is about 100cm. Therefore, the luminescence power used for infrared ray communication is set as the value which can cover this communication range enough.

[0004] By the way, such a wireless personal digital assistant with infrared communication facility is a cradle (a cradle says the thing of a mounted adapter which has a current supply function, a handsfree function, communication facility with a personal digital assistant, etc.) in order to perform data communication between the above personal computers etc., and also to be handsfree in the vehicle interior of a room of an automobile and to use it. Hereafter, when calling it a cradle, it is used in the same semantics. It may be used setting. In this case, it is more user-friendly to connect both by infrared ray communication also between a cradle and a wireless personal digital assistant.

[0005]

[Problem(s) to be Solved by the Invention] Although considering the infrared ray communication between the above-mentioned wireless personal digital assistant and a cradle the communication link between these is a communication link by about 1cm point-blank range Since the luminescence power

used for infrared ray communication is set as the value which can cover an about 100cm communication range enough. The same current as the communication link by 100cm is consumed, by this, a cell has, time amount decreases and the technical problem that the long duration use of the wireless personal digital assistant cannot be carried out occurs to communicate by point-blank range between a terminal and a cradle. That is, also in order to satisfy the request of the waiting receptacle for long duration of the wireless personal digital assistant in recent years, low-power-ization of infrared ray communication is an important technical problem for a wireless personal digital assistant with infrared communication facility.

[0006] Even if this invention changes a communication range by having been originated in view of such a technical problem, and getting to know an infrared communications partner and receiving power, as it can perform suitable infrared luminescence power control, it aims at offering the infrared luminescence power control approach between a wireless personal digital assistant with infrared communication facility, a wireless personal digital assistant with infrared communication facility, and equipment of having achieved low-power-ization of infrared ray communication.

[0007]

[Means for Solving the Problem] For this reason, the wireless personal digital assistant with infrared communication facility of this invention is characterized by having offered the infrared communications department which transmits and receives the signal in the frequency band of an infrared region, a communications-partner detection means to detect infrared communications-partner information, and the control means which controls the luminescence power in the infrared communications department according to the information on the infrared communications partner detected with this communications-partner detection means, and being constituted in a wireless personal digital assistant, (claim 1).

[0008] And this communications-partner detection means may be constituted so that infrared communications-partner information may be detected through the infrared communications department from the data received from an infrared communications partner (claim 2), or it may be constituted so that infrared communications-partner information may be detected from the connection condition of a predetermined external terminal (claim 3). Moreover, the wireless personal digital assistant with infrared communication facility of this invention It is carried in the mounted adapter which has the communication facility by infrared radiation, and sets to an usable wireless personal digital assistant. The infrared communications department which transmits and receives the signal in the frequency band of an infrared region, and the discernment section which identifies an infrared communications partner, When it is detected that an infrared communications partner is a mounted adapter in this discernment section, it is characterized by having offered the control section which reduces the luminescence power of the infrared communications department rather than the usual luminescence power, and being constituted (claim 4).

[0009] In addition, the wireless personal digital assistant with infrared communication facility of this invention With the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant A receiving power detection means to detect the receiving power information from an infrared communications partner, By using a communications-partner detection means to detect infrared communications-partner information, and the receiving power information detected with the receiving power detection means and the infrared communications-partner information detected with the communications-partner detection means It is characterized by having offered the control means which controls the luminescence power in the infrared communications department, and being constituted (claim 5).

[0010] Furthermore, the wireless personal digital assistant with infrared communication facility of this invention With the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant A receiving power information receiving means to receive the receiving power information which the infrared communications partner transmitted from an infrared communications partner detected, It is characterized by having offered the control means which controls the luminescence power in the infrared communications department, and being constituted according to that receiving power

information received with this receiving power information receiving means, (claim 6).

[0011] Moreover, the wireless personal digital assistant with infrared communication facility of this invention is characterized by to have offered the infrared communications department which transmits and receives the signal in the frequency band of an infrared region, a receiving power detection means detect the receiving power information from an infrared communications partner, and the control means which controls the luminescence power in the infrared communications department according to the receiving power information detected with this receiving power detection means, and to be constituted in a wireless personal digital assistant, (claim 7).

[0012] And the infrared luminescence power control approach between the wireless personal digital assistant with infrared communication facility and equipment of this invention Between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility It faces transmitting and receiving the signal in the frequency band of an infrared region, either [at least] the above-mentioned wireless personal digital assistant or equipment detects the information on an infrared communications partner, and it is characterized by controlling infrared luminescence power based on this detection result (claim 8).

[0013] Moreover, the infrared luminescence power control approach between the wireless personal digital assistant with infrared communication facility and equipment of this invention Between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility When it faces transmitting and receiving the signal in the frequency band of an infrared region and either [at least] the above-mentioned wireless personal digital assistant or equipment uses the receiving power information from an infrared communications partner, and the infrared communications-partner information detected with the communications-partner detection means It is characterized by controlling infrared luminescence power (claim 9).

[0014] And the infrared luminescence power control approach between the wireless personal digital assistant with infrared communication facility and equipment of this invention Between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility It faces transmitting and receiving the signal in the frequency band of an infrared region. Either [at least] the above-mentioned wireless personal digital assistant or equipment The receiving power information which that infrared communications partner transmitted from an infrared communications partner detected is received, and it is characterized by controlling infrared luminescence power based on this detection result.(claim 10).

[0015] Furthermore, the infrared luminescence power control approach between the wireless personal digital assistant with infrared communication facility and equipment of this invention Between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility It faces transmitting and receiving the signal in the frequency band of an infrared region, either [at least] the above-mentioned wireless personal digital assistant or equipment detects the receiving power information from an infrared communications partner, and it is characterized by controlling infrared luminescence power based on this detection result (claim 11).

[0016]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

(A) Although the explanatory view 1 of the 1st operation gestalt of this invention is a block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility as 1 operation gestalt of this invention As shown in this drawing 1 R> 1, the wireless personal digital assistant MT with this infrared communication facility Besides the part which has the original radio function which consists of an antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec (CODEC) 4, a microphone 5, and loudspeaker 6 grade The infrared communications department 7 as the infrared transceiver (or infrared transmission-and-reception light) section, the communications-partner detecting element (communications-partner detection means) 8, and a control section (control means) 9 are offered, and it is constituted. In addition, the wireless personal digital assistant MT with this infrared communication facility has the carrier light emitting device unit 10, the

variable-resistance section 11, CPU12 and ROM13, and the RAM14 grade other than the above-mentioned antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade as hardware.

[0017] An antenna 1 is an antenna both for transceiver here. The wireless transceiver section 2 By having the frequency-conversion sections, such as an up converter and a down converter It is what performs frequency conversion between RF (radio frequency) signal and IF (intermediate frequency) signal. The strange recovery section 3 performs strange recovery processing, a codec 4 performs coding processing or decryption processing, a microphone 5 and a loudspeaker 6 have a transmission-and-reception talk function, and since all of these members are well-known, the further explanation is omitted.

[0018] Moreover, the infrared communications department 7 transmits and receives the signal in the frequency band of an infrared region, and the function of this infrared communications department 7 is demonstrated in the carrier light emitting device unit 10 or the variable-resistance section 11.

Furthermore, the communications-partner detecting element 8 detects infrared communications-partner information from the data received from an infrared communications partner through the infrared communications department 7, according to the information on an infrared communications partner that the control section 9 was detected by the communications-partner detecting element 8, the luminescence power in the infrared communications department 7 is controlled, it is CPU12, ROM13, and RAM14 grade, and the function of these communications-partner detecting elements 8 and control sections 9 is demonstrated. Therefore, this communications-partner detecting element 8 will receive data from an infrared communications partner through the infrared communications department 7, and will also have a function as the discernment section which discriminates an infrared communications partner from these received data.

[0019] And the carrier light emitting device unit 10 consists of light emitting device 10B, such as photo detector 10A, such as a photodiode, and light emitting diode (LED:Light Emitting Diode), light emitting device drive circuit (LED driver) 10C, etc. Moreover, the variable-resistance section 11 consists of the switching transistor Tr1 and Tr2 grade which change an ohms-connection condition to the resistance R1 and R2 mutually connected to juxtaposition. While resistance R1 and R2 will be in a parallel connection condition and a current will flow to both resistance R1 and R2 if switching transistors Tr1 and Tr2 are turned on as shown in drawing 9 (a), as shown in drawing 9 (b) If switching transistors Tr1 and Tr2 are turned off, resistance R1 will be separated, only resistance R2 will be connected, and a current will flow only to resistance R2. And resistance RLOW in the condition that only resistance R2 was connected Resistance RSTD in case resistance R1 and R2 is in a parallel connection condition Since the value of the direction is small, it turns out that the drive current to light emitting device 10B becomes large.

[0020] Thereby, in this wireless personal digital assistant MT, the part which has the original radio function which consists of an antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade can be used, and radio can be performed. And the data (received data) received by photo detector 10A of the carrier light emitting device unit 10 of the infrared communications department 7 are incorporated by CPU12, and when this CPU12 functions as a communications-partner detecting element 8 by ROM13, RAM14 grade, and collaboration, infrared communications-partner information is detected from received data. Furthermore, when CPU12 functions as a control section 9 by ROM13, RAM14 grade, and collaboration, by outputting the power control signal according to the information on an infrared communications partner to the variable-resistance section 11, the drive current to light emitting device 10B is changed to two steps, and the luminescence power in the infrared communications department 7 is controlled. And transmit data is transmitted to an infrared communications partner from light emitting device 10B via LED driver 10C. Moreover, this communications-partner detecting element 8 will be constituted so that infrared communications-partner information may be detected through the infrared communications department 7 from the data received from an infrared communications partner.

[0021] In addition, in order to show the appearance of the wireless personal digital assistant MT with this infrared communication facility in drawing 4 (a) and (b) and to demonstrate an original radio

function in this wireless personal digital assistant MT, the antenna 1, the push button group 15 for actuation, and the display 16 grade are arranged. In addition, the push button group 15 can be covered using lid 15A. Furthermore, the aperture 17 for infrared transmission and reception in the infrared communications department 7 is formed in the side-attachment-wall section of terminal casing. And this aperture 17 is covered by opaque infrared transparency member 17A.

[0022] Although drawing 2 is the block diagram showing the configuration of the cradle which has the communication facility by the infrared radiation which performs infrared ray communication between wireless personal digital assistants with this infrared communication facility, as shown in this drawing 2, this cradle CD has the carrier light emitting device unit 21, CPU22, ROM23 and RAM24, a codec (CODEC) 25, a loudspeaker 26, and the microphone jack 27.

[0023] Here, the carrier light emitting device unit 21 functions as the infrared communications department which transmits and receives the signal in the frequency band of an infrared region between the wireless personal digital assistants MT with this infrared communication facility, and consists of light emitting device 21B, such as photo detector 21A, such as a photodiode, and a light emitting diode (LED), light emitting device drive circuit (LED driver) 21C, etc. In addition, between light emitting device 21B and LED driver 21C, the resistance R which has the resistance to which light emitting device 21B may emit light by the low power suitable for about 1cm point-blank range is infix.

[0024] Moreover, although the loudspeaker 26 is built in this cradle CD, a microphone 28 is used by connecting with the microphone jack 27. The voice data (received data) from the wireless personal digital assistant MT with this infrared communication facility received by photo detector 21A of the carrier light emitting device unit 21 is processed in CPU22, ROM23, and RAM24 grade by this. While it is codec 25 course and is outputted from a loudspeaker 26 after that, the sound signal from a microphone 28 After going via a codec 25, it is processed in CPU22, ROM23, and RAM24 grade, and is transmitted to the wireless personal digital assistant MT with this infrared communication facility as a communications partner from light emitting device 21B via LED driver 21C as a sending signal (transmit data).

[0025] In addition, although it is the mounted adapter which the appearance of Cradle CD is shown in drawing 5 (a) and (b), and this cradle CD is arranged in the proper place of the vehicle interior of a room of an automobile, and has a current supply function, a handsfree function, communication facility with a personal digital assistant, etc. This cradle CD has the terminal applied part 29 equipped with this wireless personal digital assistant MT in the top-face section, and aperture 21D for infrared transmission and reception of the carrier light emitting device unit 21 is formed in the aperture 17 for infrared transmission and reception of this wireless personal digital assistant MT in the terminal applied part 29, and the part which should counter. This aperture 21D is also covered by the opaque infrared transparency member (not shown). Moreover, the microphone jack 27 is formed in the lateral portion of Cradle CD.

[0026] Although drawing 3 is the block diagram showing the configuration of the personal computer which has the communication facility by the infrared radiation which performs infrared ray communication between wireless personal digital assistants with this infrared communication facility, as shown in this drawing 3 R>3, this personal computer PC has the carrier light emitting device unit 36 grade other than a part which has the original personal computer function of CPU30, ROM31, RAM32, a keyboard 33, a mouse 34, and display section 35 grade.

[0027] Here, the carrier light emitting device unit 36 functions as the infrared communications department which transmits and receives the signal in the frequency band of an infrared region between the wireless personal digital assistants MT with this infrared communication facility, and consists of light emitting device 36B, such as photo detector 36A, such as a photodiode, and a light emitting diode (LED), light emitting device drive circuit (LED driver) 36C, etc. In addition, between light emitting device 36B and LED driver 36C, resistance R' which has the resistance to which light emitting device 36B may emit light by the power suitable for the distance of about 100cm is infix.

[0028] In addition, a keyboard 33, a mouse 34, and the display section 35 are connected to this personal computer PC through Connectors 33A, 34A, and 35A. By this, this personal computer PC demonstrates

an original personal computer function using CPU30, ROM31, RAM32, a keyboard 33, a mouse 34, and display section 35 grade, and also is photo detector 36A of the carrier light emitting device unit 36. While the data signal (received data) from the received wireless personal digital assistant MT with this infrared communication facility is processed in CPU30, ROM31, and RAM32 grade The data (transmit data) from a personal computer PC It is processed in CPU30, ROM31, and RAM32 grade, and is transmitted to the wireless personal digital assistant MT with this infrared communication facility as a communications partner from light emitting device 36B via LED driver 36C as a sending signal (transmit data).

[0029] The wireless personal digital assistant MT with this infrared communication facility may be used in order to perform data communication between personal computers PC as are shown in drawing 6 and 7, and it is set to Cradle CD and indicated in drawing 8 as the case where it is used in order are handsfree and to telephone. Hereafter, the actuation is explained using drawing 6 - drawing 13 about each case.

[0030] First, in this wireless personal digital assistant MT, as shown in drawing 6 and 7, it sets to Cradle CD and is handsfree, and the case where it is used in order to telephone is explained. In this case, as shown in drawing 7 , this wireless personal digital assistant MT is first set to the terminal applied part 29 of Cradle CD. Thereby, aperture 21D, as a result the carrier light emitting device unit 21 for infrared transmission and reception of the aperture 17 for infrared transmission and reception of this wireless personal digital assistant MT as a result the carrier light emitting device unit 10, and Cradle CD counter.

[0031] As shown in drawing 10 , a connection request is advanced from Cradle CD side by this condition. In response, this wireless personal digital assistant MT returns a connection confirm. After that, device information is exchanged to each other. Thereby, by the communications-partner detecting element 8, this wireless personal digital assistant MT gets to know that a partner is Cradle CD from received data, and outputs a power control signal which serves as a low power according to Cradle CD by the control section 9 to the variable-resistance section 11. A signal which makes switching transistors Tr1 and Tr2 turn off is specifically outputted, you separate resistance R1, and a current makes it make it only resistance R2 flow. Moreover, thereby to light emitting device 10B, the small current for cradle CD flows. Furthermore, this wireless personal digital assistant MT is carried in the cradle CD (mounted adapter) which has the communication facility by infrared radiation, is usable and is set to the infrared communications department 7. Transmit and receive the signal in the frequency band of an infrared region, and it sets to the communications-partner detecting element (discernment section) 8. An infrared communications partner is identified, and in a control section 9, when it is detected that an infrared communications partner is Cradle CD (mounted adapter) in the communications-partner detecting element (discernment section) 8, the luminescence power of the infrared communications department 7 is reduced rather than the usual luminescence power.

[0032] Thus, where this wireless personal digital assistant MT is set to Cradle CD, where luminescence power is controlled, infrared ray communication is performed, consequently low-power-ization of infrared ray communication can be achieved.

[0033] Next, the case where this wireless personal digital assistant MT is used in order to perform data communication between personal computers PC, as shown in drawing 8 is explained. In this case, the control approach changes, and by within the limits which is about 100cm, this wireless personal digital assistant MT is put on the location in which a personal computer PC and distance were opened, and first, the aperture 17 for infrared transmission and reception of this wireless personal digital assistant MT as a result the carrier light emitting device unit 10, and the carrier light emitting device unit 36 of a personal computer PC counter, and are arranged.

[0034] As shown in drawing 11 , a connection request is advanced from a personal computer PC side by this condition. In response, this wireless personal digital assistant MT returns a connection confirm. Since the exchange of device information is not performed to each other after that, this wireless personal digital assistant MT gets to know that a partner is not Cradle CD from received data by that communications-partner detecting element 8, and outputs a power control signal which serves as power

consumption (that is, power consumption which can perform certainly infrared ray communication with a distance of about 100cm) according to the equipment (this example the personal computer PC) which is not Cradle CD by that control section 9 to the variable-resistance section 11. As drawing 9 (a) and (b) explained, a signal which makes switching transistors Tr1 and Tr2 turn on is specifically outputted, and it is made for a current to flow to both resistance R1 and R2. Thereby, to light emitting device 10B, the big current which is not an object for cradle CD flows. Thus, in this condition, infrared ray communication in sufficient luminescence power condition is performed.

[0035] Therefore, between the wireless personal digital assistant MT with infrared communication facility, and equipment with infrared communication facility (Cradle CD or a personal computer PC), it faces transmitting and receiving the signal in the frequency band of an infrared region, and the wireless personal digital assistant MT will detect the information on an infrared communications partner, and will control infrared luminescence power by the infrared luminescence power control approach between this wireless personal digital assistant with infrared communication facility and equipment based on this detection result.

[0036] If the control point by the side of this wireless personal digital assistant MT which included each above-mentioned mode is shown, it will become like drawing 12. First, if it checks whether the connection request has been received at step A1 and this wireless personal digital assistant MT receives a connection request, this wireless personal digital assistant MT will take the YES root of step A1, will set up a connection confirm at step A2, and will return a connection confirm to a communications partner. In addition, when a connection request is not received, it waits for it until this wireless personal digital assistant MT receives it (NO root of step A1). And after step A2, this wireless personal digital assistant MT receives waiting (NO root of step A3), and device information for reception of device information (YES root of step A3), if it is Cradle CD, will take the YES root in step A4, and will perform infrared low (low) power control (step A5).

[0037] By this, where luminescence power is controlled, infrared ray communication can be performed, consequently low-power-ization of infrared ray communication can be achieved. Then, after usually communicating (step A6), supervising whether it is communication link termination (NO root of step A7) and completing a communication link, this wireless personal digital assistant MT takes the YES root of step A7, and usually returns infrared luminescence power to a setup (step A8).

[0038] When the device information which this wireless personal digital assistant MT received by step A4 is not Cradle CD (for example, personal computer), NO root of step A4 is taken and it usually communicates (step A6). In these condition, infrared ray communication in sufficient luminescence power condition is performed, and infrared low (low) power control is performed by neither.

[0039] Thus, where this wireless personal digital assistant MT is set to Cradle CD, when this wireless personal digital assistant MT gets to know the cradle CD as an infrared communications partner, where luminescence power is controlled, infrared ray communication can be performed, consequently low-power-ization of infrared ray communication can be achieved, and also the infrared ray communication in sufficient luminescence power condition becomes possible at the time of infrared ray communication with a personal computer PC.

[0040] Moreover, if other control points by the side of this wireless personal digital assistant MT which included each above-mentioned mode are shown, it will become like drawing 13. That is, if this wireless personal digital assistant MT checks whether the connection request has been received at step B1 and a connection request is received, it takes the YES root of step B1, will be step B-2, will set up a connection confirm, and will return a connection confirm to a communications partner. In addition, when a connection request is not received, it waits for it until this wireless personal digital assistant MT receives it (NO root of step B1). After step B-2, if this wireless personal digital assistant MT receives waiting (NO root of step B3), and device information for reception of device information, the YES root of step B3 will be taken and an infrared communications partner will judge whether they are Cradle CD and a personal computer PC in step B4.

[0041] If device information shows that it is the cradle CD which is a low power authorization device, this wireless personal digital assistant MT takes the YES root of step B4, will be step B5, will perform

infrared low power control, and will be step B6, and it will supervise whether the gap produced the infrared link. supposing it has separated, although this wireless personal digital assistant MT usually returns infrared luminescence power to a setup (step B7), it is natural -- when a gap does not produce an infrared link (NO root of step B6), this wireless personal digital assistant MT continues infrared low (low) power control. Consequently, this wireless personal digital assistant MT can achieve low-powerization of infrared ray communication.

[0042] Then, it supervises whether this wireless personal digital assistant MT usually communicated (step B8), and the communication link ended it (NO root of step B9). After a communication link is completed here, this wireless personal digital assistant MT takes the YES root of step B9, and usually returns infrared luminescence power to a setup [a communication link setup with usual devices other than a low power authorization device (for example, the personal computer PC)] (step B10).

[0043] On the other hand, by step B4, if the communications partner of this wireless personal digital assistant MT is the personal computer PC which is not a low power authorization device, NO root is taken and, as for this wireless personal digital assistant MT, a communication link is usually performed.

[0044] Even if such, where this wireless personal digital assistant MT is set to Cradle CD, low-powerization of infrared ray communication can be achieved, and also at the time of infrared ray communication with a personal computer PC, the infrared ray communication in sufficient luminescence power condition becomes possible.

[0045] (A1) Although the information on the infrared communications partner of this wireless personal digital assistant MT was acquired by infrared means of communications as received data with the above-mentioned 1st operation gestalt which is explanation of the modification of the 1st operation gestalt of this invention, this is detectable with an option. In this case, it is in the condition which set this wireless personal digital assistant MT to Cradle CD, and detects that an infrared communications partner is Cradle CD by connecting the cradle connection detection terminal of this wireless personal digital assistant MT to the terminal of Cradle CD.

[0046] That is, in this case, as shown in drawing 14, the cradle connection detection terminal 18 as a predetermined external terminal is formed in this wireless personal digital assistant MT, and discernment of whether this cradle connection detection terminal 18 is connected with cradle terminal 18A of Cradle CD is performed to it by the communications-partner detecting element 8 which consists of CPU12 grades. This discernment approach is possible because the cradle connection detection terminal 18 will be set to a low level if the cradle connection detection terminal 18 and cradle terminal 18A are connected, and the cradle connection detection terminal 18 will become high-level if the cradle connection detection terminal 18 and cradle terminal 18A are not connected. That is, this cradle connection detection terminal 18 is functioning as the discernment section.

[0047] Moreover, it is carried in the cradle CD (mounted adapter) which has the communication facility by infrared radiation, and sets to the usable wireless personal digital assistant MT. The infrared communications department 7 which transmits and receives the signal in the frequency band of an infrared region, and the discernment section which identifies an infrared communications partner (cradle connection detection terminal 18). When it is detected that an infrared communications partner is Cradle CD in this discernment section, the control section 9 which reduces the luminescence power of the infrared communications department 7 rather than the usual luminescence power will be offered.

[0048] Therefore, when being used in order set to Cradle CD and are handsfree and to telephone as this wireless personal digital assistant MT shows drawing 6 and 7 First, since the cradle connection detection terminal 18 and cradle terminal 18A are connected by setting this wireless personal digital assistant MT to the terminal applied part 29 of Cradle CD This wireless personal digital assistant MT gets to know that a partner is Cradle CD by the communications-partner detecting element 8, and outputs a power control signal which serves as a low power according to Cradle CD by the control section 9 to the variable-resistance section 11. As drawing 9 (a) and (b) explained, a signal which makes switching transistors Tr1 and Tr2 turn off is outputted, and you separate resistance R1, and a current makes it make it only resistance R2 specifically flow also in this case. Thereby, the small current for cradle CD flows to light emitting device 10B. Therefore, where this wireless personal digital assistant MT is set to Cradle

CD, and luminescence power is controlled, infrared ray communication is performed. Consequently, low-power-ization of infrared ray communication can be achieved.

[0049] Moreover, as shown in drawing 8, in order that this wireless personal digital assistant MT may perform data communication between personal computers PC, when being used Since it does not connect, the cradle connection detection terminal 18 and cradle terminal 18A this wireless personal digital assistant MT By that communications-partner detecting element 8, it gets to know that a partner is not Cradle CD, and a power control signal which serves as power consumption according to the equipment (this example the personal computer PC) which is not Cradle CD by that control section 9 is outputted to the variable-resistance section 11. That is, the communications-partner detection means 8 will be constituted so that infrared communications-partner information may be detected from the connection condition of a predetermined external terminal. And this wireless personal digital assistant MT usually carries out a luminescence power output to a setup, and makes it the magnitude which can perform certainly infrared ray communication with a personal computer [PC] and a distance of 100cm. As drawing 9 R>9 (a) and (b) explained, a signal which makes switching transistors Tr1 and Tr2 turn on is outputted, and it is made for a current to specifically flow to both resistance R1 and R2 also in this case. Thereby, the big current which is not an object for cradle CD flows to light emitting device 10B, and infrared ray communication in sufficient luminescence power condition is performed to it in this condition.

[0050] And although the control point by the side of this wireless personal digital assistant MT in this case also becomes like drawing 12 and 13, instead of judging existence of the device information reception in step A3 of drawing 12, and step B3 of drawing 13, a communications partner is detected from the connection condition of the cradle connection terminal 18, and ON/OFF of low power control activation are performed. That is, in the case of this wireless personal digital assistant MT, a communications partner is detected according to the connection condition of the cradle connection terminal 18, and Cradle CD and a personal computer PC are recognized for a communications partner. And if waiting (NO root of step B1) and a connection request are received until this wireless personal digital assistant MT receives a connection request (YES root of step B1), it sets up a connection confirm (step B-2), skips step B3, takes the YES root in step B4, and if a communications partner is a personal computer PC, it will take NO root, and will usually communicate after step B8.

[0051] Thus, through a cradle connection terminal, with a communications-partner detection means, this wireless personal digital assistant MT identifies the partner, can perform suitable power control suitable for each, and can achieve low-power-ization.

[0052] (B) The wireless personal digital assistant MT concerning the explanation book operation gestalt of the 2nd operation gestalt of this invention detects an infrared communications partner, and if an infrared communications partner is a personal computer PC, it can control luminescence power by the communication range. Namely, when this wireless personal digital assistant MT is put on Cradle CD While dropping the luminescence power on a low, when this wireless personal digital assistant MT performs a personal computer PC and infrared ray communication When the communication range has separated about 100cm Usually, if infrared luminescence power is outputted by setup with initial value (maximum), it enables it to ensure a communication link and this communication range turns into short paddle distance from 100cm, control on which luminescence power is dropped will be performed according to that communication range.

[0053] In addition, sufficient infrared luminescence power for both this wireless personal digital assistant MT and the personal computer PC to usually perform the communication link of about 100cm shall be outputted as a premise in the case of performing such control. Moreover, they are PMTR, PMTS, PPCR, PPCS, and PCDS because of the following explanation. Five kinds of values are defined. PMTR The light-receiving power value and PMTS which were detected at this wireless personal digital assistant MT edge The luminescence power value at the time of this wireless personal digital assistant MT transmitting, and PPCR The light-receiving power value and PPCS which were detected at the personal computer PC edge are a luminescence power value at the time of a personal computer PC transmitting, and PCDS. The luminescence power value at the time of Cradle CD transmitting is

expressed, respectively.

[0054] Although drawing 15 is the block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility as the 2nd operation gestalt of this invention As shown in this drawing 15, the wireless personal digital assistant MT with this infrared communication facility While offering the part which has the original radio function which consists of an antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade like the above-mentioned 1st operation gestalt The part which has the infrared communication facility which consists of the infrared communications department 7, the communications-partner detecting element 8, a receiving power detecting element (receiving power detection means) 40, and control-section (control means) 43 grade is offered, and it is constituted.

[0055] As hardware, in addition, this wireless personal digital assistant MT Besides the above-mentioned antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade It has the carrier light emitting device unit 10, an amplifier 41, the analog / digital transducer 42 (A/D-conversion section), CPU12 and ROM13, and RAM14 grade. The appearance of the wireless personal digital assistant MT concerning this 2nd operation gestalt as well as the thing concerning the above-mentioned 1st operation gestalt is shown in drawing 4 (a) and (b).

[0056]

[0057] Here, the infrared communications department 7 transmits and receives the signal in the frequency band of an infrared region, and this function is demonstrated in the carrier light emitting device unit 10. Moreover, the communications-partner detecting element 8 detects infrared communications-partner information (a personal computer PC and Cradle CD) from the data received from an infrared communications partner through the infrared communications department 7, and this function is demonstrated in CPU12, ROM13, and RAM14 grade.

[0058] The receiving power detecting element 40 detects the receiving power PMTR in the receiving side which separated a necessary distance from the infrared communications partner (receiving power value detected at this wireless personal digital assistant MT edge), and the function of this receiving power detecting element 40 is demonstrated by an amplifier 41 and the A/D-conversion section 42. Moreover, a control section 43 is the receiving power information PMTR detected by the receiving power detecting element 40. By using the infrared communications-partner information detected by the communications-partner detecting element 8 When the communications partner which controls the luminescence power in the infrared communications department 7, and was detected by the communications-partner detecting element 8 is Cradle CD A communications partner is the receiving power PMTR by which it was detected by the receiving power detecting element 40 at the times, such as a personal computer PC, while reducing the luminescence power PMTS (luminescence power value at the time of this wireless personal digital assistant MT transmitting). It responds and is the luminescence power PMTS in the infrared communications department 7. It controls. And the function of this control section 43 is demonstrated in CPU12, ROM13, and RAM14 grade. Here, as for luminescence power control of the control section 43 at the times, such as a personal computer PC, a communications partner is performed as follows.

[0059] That is, this wireless personal digital assistant MT is the receiving power PMTR detected by the receiving power detecting element 40. Necessary reference-value PREF-MT is compared and it is this receiving power PMTR. A difference with reference-value PREF-MT is embraced, and it is the luminescence power PMTS of the infrared communications department 7. While controlling, it is this receiving power information PMTR. It considers as transmit data and transmits to an infrared communications partner (for example, the personal computer PC). In addition, the value equivalent to the minimum light-receiving power value to which this reference-value PREF-MT can carry out infrared ray communication proper is set up. Moreover, according to the electrical-potential-difference value in the output of the A/D-conversion section 42 of the receiving power detecting element 40, a control signal is outputted to automatic-gain-control (AGC) 10C' from CPU12, and it is the luminescence power PMTS. It is controlled by the continuous value and gets.

[0060] Moreover, the carrier light emitting device unit 10 consists of automatic-gain-control (AGC) type light emitting device drive circuit (AGC type LED driver) 10C' etc. besides light emitting device 10B, such as photo detector 10A, such as a photodiode, and light emitting diode (LED). Therefore, the drive current to light emitting device 10B is changed continuously, and it is the luminescence power PMTS of light emitting device 10B. It can control and is the luminescence power PMTS of a light emitting device. Not two step controls of Hy Law by turning on and off of a transistor which was explained by drawing 9 (a) and (b) but continuous fine control is attained.

[0061] This wireless personal digital assistant MT uses by this the part which has the original radio function which consists of an antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade like the case of the 1st operation gestalt. Can perform radio and also a communications partner is detected by the communications-partner detecting element 8 from the received data in the output of photo detector 10A of the carrier light emitting device unit 10 of the infrared communications department 7. And receiving power information PMTR on the light which comes by the receiving power detecting element 40 from an infrared communications partner based on the current value which flows this photo detector 10A It is detected. That is, the received data from this photo detector 10A are inputted into CPU12, and an infrared communications partner is detected by functioning as a communications-partner detecting element 8 by these CPU12 and ROM13, and RAM14 grade. And when this infrared communications partner is Cradle CD, the drive current to light emitting device 10B is lessened by CPU's12 outputting a power control signal (low power) to AGC type LED driver 10C', and lowering the gain of this AGC type of LED driver 10C', and it is the luminescence power PMTS in the infrared communications department 7. It is made the low-power output for communication-range 1cm.

[0062] On the other hand, after in the case of a personal computer PC etc. the current value which flows photo detector 10A of the carrier light emitting device unit 10 is changed into an electrical-potential-difference value by the amplifier 41 and an infrared communications partner is further made into digital value in the A/D-conversion section 42, it is inputted into CPU12. And receiving power information PMTR on the light which comes from an infrared communications partner when CPU12, and these ROM13 and RAM14 function as a control section 43 By outputting the embraced power control signal to AGC type LED driver 10C', and changing that gain, the drive current to light emitting device 10B is changed continuously, and it is the luminescence power PMTS in the infrared communications department 7. It controls. Moreover, transmit data is the receiving power information PMTR detected while being transmitted to the communications partner from light emitting device 10B via LED driver 10C'. It is sent out to an infrared communications partner.

[0063] Therefore, it faces transmitting and receiving the signal in the frequency band of an infrared region between this wireless personal digital assistant MT and a personal computer PC, and this wireless personal digital assistant MT is the receiving power information PMTR from an infrared communications partner. By using the infrared communications-partner information detected with the communications-partner detection means 8, it is the infrared luminescence power PMTS. The approach of controlling will be taken.

[0064] Although drawing 16 is the block diagram showing the configuration of the personal computer PC which has the communication facility by the infrared radiation which performs infrared ray communication between wireless personal digital assistants with this infrared communication facility Although this personal computer PC has the original personal computer function of CPU30, ROM31, RAM32, a keyboard 33, a mouse 34, and display section 35 grade as shown in this drawing 16 The configuration of the carrier light emitting device unit 36 which functions as the infrared communications department which transmits and receives the signal in the frequency band of an infrared region between these wireless personal digital assistants MT differs from the above-mentioned 1st operation gestalt for a while.

[0065] That is, the carrier light emitting device unit 36 consists of automatic-gain-control (AGC) type light emitting device drive circuit (AGC type LED driver) 36C' etc. besides light emitting device 36B, such as photo detector 36A, such as a photodiode, and light emitting diode (LED). Therefore, the drive

current to light emitting device 36B is changed continuously, and it is the luminescence power PPCS of light emitting device 36B. It is controllable.

[0066] Moreover, it is the receiving power information PMTR (this receiving power information PMTR) that the wireless personal digital assistant MT answered from this wireless personal digital assistant MT obtained through photo detector 36A detected this personal computer PC. luminescence power value PPCS of a personal computer PC correlation -- having -- with the function of the receiving (it takes out) power information receive section (receiving power information receiving means) 45 which receives Receiving power information PMTR received in this receiving power information receive section 45 It responds and is the luminescence power PPCS in light emitting device 36B. It has the function of the control section 60 to control, and these functions are demonstrated by CPU30, ROM31, and RAM32.

[0067] namely, luminescence power value PPCS at the time of a personal computer PC transmitting this wireless personal digital assistant MT which separated the predetermined communication range -- light-receiving power value PMTR ***** -- it is detected. light-receiving power value PMTR of this wireless personal digital assistant MT of this Luminescence power value PPCS of a personal computer PC since there is correlation -- this light-receiving power value PMTR a letter is answered from this wireless personal digital assistant MT to a personal computer PC -- a personal computer PC -- one's luminescence power value -- PPCS from -- it can change into PPCS-NEW. If, as for this, the received data from photo detector 36A of the personal computer PC of drawing 16 are inputted into CPU30, the receiving power information receive section 45 is the data to the receiving power information PMTR. Taking out, a control section 60 is the taken-out receiving power information PMTR. Luminescence power PPCS of light emitting device 36B It controls.

[0068] Luminescence power control by the control section 60 is performed as follows. That is, a personal computer PC is the receiving power information PMTR answered from the wireless personal digital assistant MT. Necessary reference-value PREF-PC is compared and it is the receiving power information PMTR. A difference with reference-value PREF-PC is embraced, and it is the luminescence power PPCS of light emitting device 36B. It controls. Moreover, the value equivalent to the minimum light-receiving power value which can perform infrared ray communication proper is set up, and this reference-value PREF-PC is the luminescence power PPCS small when a communication range is short. It is the luminescence power PPCS in light emitting device 36B so that it may be outputted. It is controlled.

[0069] Here, in order to distinguish from other control approaches in the following explanation, two kinds of control names (control modes 1 and 2) are defined. namely, the control mode 1 -- this wireless personal digital assistant MT of this -- like -- the receiving power detecting element 40 -- receiving power PMTR detecting -- this PMTR from -- one's luminescence power PMTS It is the mode to fluctuate and the mode which controls luminescence power by magnitude of the receiving power value which he detected is meant. The control mode 2 is the power PMTR which the infrared communications partner answered from an infrared communications partner (in this case, this wireless personal digital assistant MT) received like a personal computer PC. One's luminescence power PPCS The mode to control is meant.

[0070] In addition, the point that a keyboard 33, a mouse 34, and the display section 35 are connected to this personal computer PC through Connectors 33A, 34A, and 35A is the same as the above-mentioned 1st operation gestalt. This personal computer PC uses CPU30, ROM31, RAM32, a keyboard 33, a mouse 34, and display section 35 grade like the above-mentioned 1st operation gestalt by this. Demonstrate an original personal computer function, and also in photo detector 36A of the carrier light emitting device unit 36 power information data PMTR from the personal computer PC which this wireless personal digital assistant MT received etc., while a data signal is processed in CPU30, ROM31, and RAM32 grade The transmit data from a personal computer PC is processed in CPU30, ROM31, and RAM32 grade, and is transmitted to the wireless personal digital assistant MT with this infrared communication facility as a communications partner from light emitting device 36B via AGC type LED driver 36C' as a sending signal (transmit data). At this time, a personal computer PC is the receiving

power information PMTR which this wireless personal digital assistant MT answered from the wireless personal digital assistant MT detected. It is the luminescence power PPCS in light emitting device 36B by responding and changing the gain of AGC type LED driver 36C'. It controls.

[0071] in order [in addition,] to take the mode which the cradle CD as an infrared communication device takes the block configuration shown in drawing 2 , and uses for this wireless personal digital assistant MT on it, carrying -- the luminescence power from light emitting device 21B -- always -- constant value PCDS it is .

[0072] If this wireless personal digital assistant MT detects an infrared communications partner by the communications-partner detecting element 8 first by such configuration and the infrared communications partner is Cradle CD, it is the luminescence power value PMTS. The communication link dropped on the low is performed. On the other hand, if the infrared communications partner is a personal computer PC, this wireless personal digital assistant MT will perform data communication with the luminescence power output according to a personal computer PC and a communication range. That is, it is the luminescence power PMTS usual when a communication range is 100cm. If it outputs and a communication range becomes shorter than 100cm, it responds to the communication range which became short, and is the luminescence power PMTS. It drops and data communication is performed. Here, the luminescence power control approach of a personal computer PC and this wireless personal digital assistant MT is as follows, respectively.

[0073] This wireless personal digital assistant MT detects the magnitude of the power of the light transmitted from the personal computer PC in that receiving power detecting element 40, and is this detected value PMTR. Necessary reference-value PREF-MT is compared. And if this comparison result is contained within the limits of predetermined, it will judge with the communication range with a personal computer PC being moderate, and it is the value PMTS of the luminescence power of light emitting device 10B. It does not change. On the other hand, it is this detected value PMTR. If too large, it judges with a communication range with a personal computer PC being too near, and is the value PMTS of the luminescence power of light emitting device 10B. It controls to make it small. Moreover, to coincidence, this wireless personal digital assistant MT is this receiving power information PMTR. It puts on transmit data and transmits to a personal computer PC.

[0074] A personal computer PC is the receiving power information PMTR from the inside of the data answered from this wireless personal digital assistant MT in the receiving power information receive section 30. It takes out and is the infrared luminescence power PPCS of light emitting device 36B. It controls. Receiving power information PMTR If it is shown that a communication range is too near, a personal computer PC is the luminescence power PPCS of light emitting device 36B. It is made small and is the receiving power information PMTR conversely. If it is a moderate value, it will judge with a communication range being suitable, and a personal computer PC will not perform luminescence power control. If it puts in another way, it can work as if this wireless personal digital assistant MT was reflecting the luminescence power value of a personal computer PC as a mirror, and the personal computer PC can know the magnitude of the power to which he is emitting light according to the receiving situation from this wireless personal digital assistant MT.

[0075] Thus, this wireless personal digital assistant MT detects an infrared communications partner, and an infrared communications partner is the luminescence power PMTS by Cradle CD and the personal computer PC. While controlling If it usually communicates with the big value (high power) in a setup if a communication range is 100cm and a communication range becomes shorter than 100cm when a communications partner is a personal computer PC Since the value is lowered and data communication is performed according to the communication range which became short, it can communicate in the magnitude of the useless power which is not, and fine control is attained.

[0076] If the control point by the side of the wireless personal digital assistant MT which included each above-mentioned mode is shown, it will become like drawing 17 . That is, first, at step C0, since it is the wireless personal digital assistant MT, if MT root is taken, it checks whether this wireless personal digital assistant MT has received the connection request from an infrared communications partner at step C1 and this is received (YES root of step C1), it will be step C2 and communications-partner

information will be detected. In addition, when a connection request is not received, it waits for it until this wireless personal digital assistant MT receives it (NO root of step C1). Moreover, detection of communications-partner information is performed through infrared ray communication, and also you may obtain from a cradle connection terminal, and this step is skipped like the modification of the 1st operation gestalt in that case.

[0077] And it is the receiving power information PMTR on the light which PC root of step C3 is taken, and this wireless personal digital assistant MT sets up a connection confirm, returns a connection confirm to a communications partner (step C4), and comes from a personal computer PC when an infrared communications partner is a personal computer PC. It detects (step C5) and is the receiving power information PMTR. Luminescence power control to which it responded is performed (step C6). Moreover, this wireless personal digital assistant MT takes the YES root of step C7, when it supervised and separates from whether the gap arose or not, and an infrared link is the infrared luminescence power PMTS at step C7. It is usually returned to a setup (step C9), and when a gap does not produce an infrared link, NO root of step C7 is taken and the usual communication link with the suitable value by which luminescence power control was carried out is performed (step C8).

[0078] If it is supervised during this usually communication link whether the communication link was completed (NO root of step C10) and a communication link is ended, the YES root of step C10 will be taken and a program will be completed. On the other hand, in step C3, when an infrared communications partner is Cradle CD, CD root of step C3 is taken, this wireless personal digital assistant MT sets up a connection confirm, and a connection confirm is returned to a communications partner (step C11), and it is the luminescence power PMTS. It usually communicates in the condition of having dropped on the low (low) (step C8).

[0079] The control point by the side of a personal computer PC has PC root taken at step C0 of drawing 1717, and is step C13. Moreover, a personal computer PC Set up a connection request, transmit a connection-request signal to this wireless personal digital assistant MT, and further, if waiting (NO root of step C14) and a connection-confirm signal are received, whether the connection-confirm signal was received at step C14 Receiving power information PMTR which took the YES root of step C14 and this wireless personal digital assistant MT detected It receives (step C5). The receiving power information PMTR Luminescence power control to which it responded is performed (step C6), and it becomes almost the same as the flow by the side of the wireless personal digital assistant MT after that.

[0080] Thus, when the infrared communications partner of this wireless personal digital assistant MT is Cradle CD, it can communicate by the minimum luminescence power and low-power-ization is promoted. Moreover, this wireless personal digital assistant MT faces transmitting and receiving the signal in the frequency band of an infrared region between personal computers PC, and this wireless personal digital assistant MT is the receiving power information PMTR from a personal computer PC. By using the infrared partner information detected with the communications-partner detection means 8, it is the infrared luminescence power PMTS. The approach of controlling is performed. That is, this wireless personal digital assistant MT is the receiving power PMTR with the receiving power detection means 40. It detects and controls by recognizing that a communications partner is a personal computer PC by the communications-partner detection means 8. And it is [whether a personal computer PC and how many communication ranges separate this wireless personal digital assistant MT, and it confronts each other and] the receiving power information PMTR from a personal computer PC at the receiving power detecting element 40 of this wireless personal digital assistant MT. It detects and recognizes from the magnitude of the value. Moreover, a personal computer PC is the receiving power information PMTR on the light answered from this wireless personal digital assistant MT. It can know whether it is a thing with the short communication range of itself and this wireless personal digital assistant MT. In this way, between the wireless personal digital assistant MT and a personal computer PC, since infrared ray communication in the minimum luminescence power condition according to a communication range can be performed and the communication link which does not take out useless luminescence power can be performed, low-power-ization by suitable luminescence power control can be attained.

[0081] (B1) It can also constitute so that the control mode of a personal computer PC may be changed

for this wireless personal digital assistant MT to the explanation reverse of the modification of the 2nd operation gestalt of this invention, a personal computer PC may take the control mode 1 conversely and this wireless personal digital assistant MT may take the control mode 2 conversely. Namely, a personal computer PC has a receiving power detecting element, and is its luminescence power PPCS by the light-receiving power information PPCR from this wireless personal digital assistant MT (receiving power value detected at the personal computer PC edge). It controls. Moreover, this wireless personal digital assistant MT is the receiving power information PPCR transmitted from the personal computer PC. Its luminescence power PMTS (luminescence power value at the time of this wireless personal digital assistant MT transmitting) is controlled.

[0082] In addition, sufficient infrared luminescence power for both this wireless personal digital assistant MT and the personal computer PC to usually perform the communication link of about 100cm shall be outputted as a premise in the case of controlling also in this modification.

[0083] If the block configuration of a wireless personal digital assistant with infrared communication facility for this is shown, it will become like drawing 18, and if the block configuration of a personal computer PC is shown, it will become like drawing 19. With the infrared communications department 7 where the wireless personal digital assistant MT shown in this drawing 18 transmits and receives the signal in the frequency band of an infrared region. The communications-partner detecting element 8 which detects infrared communications-partner information (are they a personal computer PC and Cradle CD?) from the data received from an infrared communications partner through the infrared communications department 7, Receiving power information PPCR detected at the personal computer PC edge transmitted from the personal computer PC as an infrared communications partner. With the receiving (it takes out) power information receive section 45 which receives (receiving power information receiving means) Receiving power information PPCR taken out in this receiving power information receive section 45. It responds to the infrared communications-partner information detected by the communications-partner detecting element 8, and is the luminescence power PMTS in the infrared communications department 7. The control section 44 to control is offered and it is constituted.

[0084] Moreover, the personal computer PC shown in drawing 19 is the carrier light emitting device unit 36 which functions as the infrared communications department which transmits and receives the signal in the frequency band of an infrared region, and the receiving power information PPCR from the wireless personal digital assistant MT. Receiving power information PPCR detected by the receiving power detecting element 80 to detect and the receiving power detecting element 80. It responds and is the luminescence power PPCS in the carrier light emitting device unit 36. The control section 83 to control is offered and it is constituted.

[0085] And this carrier light emitting device unit 36 consisted of light emitting device 36B, such as photo detector 36A, such as a photodiode, and a light emitting diode (LED), light emitting device drive circuit (LED driver) 36C, etc., and the receiving power detecting element (receiving power detection means) 80 has formed an amplifier 81 and the A/D-conversion section 82 like the receiving power detecting element 40 prepared in the wireless personal digital assistant MT in the 2nd operation gestalt.

[0086] Since other configurations are the same as the wireless personal digital assistant MT concerning drawing 15 and the 2nd operation gestalt shown in 16, and a personal computer PC respectively, the further explanation is omitted. in order [moreover,] to take the mode which the cradle CD as an infrared communication device takes the block configuration shown in drawing 2, and uses for this wireless personal digital assistant MT on it, carrying -- luminescence power PPCS from light emitting device 21B Regular constant value PCDS it is.

[0087] If this wireless personal digital assistant MT detects an infrared communications partner by the communications-partner detecting element 8 first by such configuration and the infrared communications partner is Cradle CD, it is the luminescence power value PMTS. The communication link dropped on the low is performed. This wireless personal digital assistant MT will perform data communication with the communication-range ***** luminescence power output, if an infrared communications partner is a personal computer PC. That is, it is the luminescence power PMTS usual when a communication range is 100cm. If it outputs and a communication range becomes shorter than

100cm, according to the communication range which became short, the value will be lowered and data communication will be performed. Here, the luminescence power control approach of a personal computer PC and this wireless personal digital assistant MT is as follows, respectively.

[0088] A personal computer PC detects the magnitude of the power of the light transmitted from this wireless personal digital assistant MT in that receiving power detecting element 80, and is this detected value PPCR. Necessary reference-value PREF-PC is compared. And if this comparison result is contained within the limits of predetermined, it will judge with the communication range with this wireless personal digital assistant MT being moderate, and it is the value PPCS of the luminescence power of light emitting device 36B. It does not change. On the other hand, it is this detected value PPCR. If too large, it judges with a communication range with this wireless personal digital assistant MT being too near, and is the luminescence power PPCS of light emitting device 36B. It controls to make a value small. Moreover, to coincidence, a personal computer PC is this receiving power information PPCR. It puts on transmit data and transmits to this wireless personal digital assistant MT.

[0089] And this wireless personal digital assistant MT is the receiving power information PPCR from the inside of the data answered from the personal computer PC in the receiving power information receive section 45. It takes out and is the infrared luminescence power PMTS in light emitting device 10B. It controls. Receiving power information PPCR If it is shown that a communication range is too near, this wireless personal digital assistant MT is the luminescence power PMTS. It is made small and is the receiving power information PPCR conversely. If it is a moderate value, it will judge with a communication range being suitable, and this wireless personal digital assistant MT will not perform luminescence power control. If it puts in another way, it can work as if the personal computer PC was reflecting the luminescence power value of this wireless personal digital assistant MT as a mirror, and this wireless personal digital assistant MT can know the magnitude of the power to which he is emitting light according to the receiving situation from a personal computer PC.

[0090] Moreover, the control point of the wireless personal digital assistant MT in this modification and a personal computer PC is almost the same except for step C5 of the flow of drawing 17. That is, it sets to step C5 of drawing 17, and this wireless personal digital assistant MT is the receiving power information PPCR from a personal computer PC. Receiving power information PMTR on light that receive and a personal computer PC comes from this wireless personal digital assistant MT It becomes being the same as that of the aforementioned flow except the point to detect.

[0091] Thus, when the infrared communications partner of this wireless personal digital assistant MT is Cradle CD, it can communicate by the minimum luminescence power and low-power-ization is promoted. Moreover, receiving power information PPCR which the personal computer PC with which this wireless personal digital assistant MT faces transmitting and receiving the signal in the frequency band of an infrared region between personal computers PC, and this wireless personal digital assistant MT is transmitted from a personal computer PC detected It receives and the approach of controlling infrared luminescence power is performed based on this detection result. That is, it is [whether this wireless personal digital assistant MT and a communication range separate which grade, and the personal computer PC confronts each other and] the receiving power information PPCR from this wireless personal digital assistant MT at the receiving power detecting element 80 of a personal computer PC. It detects and recognizes from the magnitude of the value. Moreover, this wireless personal digital assistant MT is the receiving power information PPCR on the light answered from the personal computer PC. It can know with itself whether a communication range with a personal computer PC is near. in this way, the communication link which can perform infrared ray communication in the minimum luminescence power condition according to a communication range, and does not take out useless luminescence power between the wireless personal digital assistant MT and a personal computer PC -- it can carry out -- suitable and texture -- warm luminescence power control can be carried out and low-power-ization can be attained.

[0092] (C) The both sides of the explanation book wireless personal digital assistant MT of the 3rd operation gestalt of this invention and a personal computer PC can take the control mode 2. The wireless personal digital assistant with infrared communication facility for this The wireless personal digital

assistant MT with infrared communication facility which takes a block configuration as shown in drawing 20, and is shown in this drawing 20 While offering the part which has the original radio function which consists of an antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade like the above-mentioned 1st operation gestalt The infrared communications department 7, the communications-partner detecting element 8, the receiving power detecting element 40, a control section 43, and the receiving power information receive section 84 are offered, and it is constituted. As hardware, moreover, this wireless personal digital assistant MT Besides the above-mentioned antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade It has the carrier light emitting device unit 10, an amplifier 41, the analog / digital transducer 42, CPU12 and ROM13, and RAM14 grade. The appearance of the wireless personal digital assistant MT concerning this 3rd operation gestalt as well as the thing concerning the above-mentioned 1st operation gestalt is shown in drawing 4 (a) and (b).

[0093] Here, the infrared communications department 7 transmits and receives the signal in the frequency band of an infrared region, and this function is demonstrated by light emitting device (LED) 10B, such as photo detector 10A in the carrier light emitting device unit 10, such as a photodiode, and a light emitting diode, light emitting device drive circuit (LED driver) 10C, etc. Moreover, the communications-partner detecting element 8 detects infrared communications-partner information (a personal computer PC and Cradle CD) from the data received from an infrared communications partner through the infrared communications department 7, and this function is demonstrated in CPU12, ROM13, and RAM14 grade. Furthermore, the receiving power detecting element 40 is the receiving power PMTR in the receiving side which separated a necessary distance from the infrared communications partner. It detects and the function of this receiving power detecting element 40 is demonstrated by an amplifier 41 and the A/D-conversion section 42.

[0094] Moreover, a control section 43 is the receiving power information PMTR detected by the receiving power detecting element 40. By using the infrared communications-partner information detected by the communications-partner detecting element 8 When the communications partner which controls the luminescence power in the infrared communications department 7, and was detected by the communications-partner detecting element 8 is Cradle CD Luminescence power PMTS A communications partner is the receiving power PMTR by which it was detected by the receiving power detecting element 40 at the times, such as a personal computer PC, while making it decrease. It responds and is the luminescence power PMTS in the infrared communications department 7. It controls.

[0095] And the receiving power information receive section 84 is the receiving power information PPCR which the personal computer PC answered from the personal computer PC as an infrared communications partner detected. It receives and this function is demonstrated in CPU12, ROM13, and RAM14 grade (it takes out). From now on, this wireless personal digital assistant MT of this will have taken the control mode 2.

[0096] Moreover, the block diagram of the personal computer PC applied to the 3rd operation gestalt of this invention at drawing 21 is shown similarly. The carrier light emitting device unit 36, the receiving power detecting element 80, a control section 83, and the receiving power information receive section 85 are offered, and the personal computer PC shown in this drawing 21 R> 1 is constituted while it has the original personal computer function of CPU30, ROM31, RAM32, a keyboard 33, a mouse 34, and display section 35 grade.

[0097] Here, besides light emitting device 36B, such as photo detector 36A, such as a photodiode, and light emitting diode (LED), the carrier light emitting device unit 36 consists of automatic-gain-control (AGC) type light emitting device drive circuit (AGC type LED driver) 36C' etc., and functions as the infrared communications department which transmits and receives the signal in the frequency band of an infrared region between these wireless personal digital assistants MT. Moreover, the receiving power detecting element 80 is the receiving power information PPCR from this wireless personal digital assistant MT. It detects and this function is demonstrated in an amplifier 81 and the A/D-conversion section 82.

[0098] And a control section 83 is the receiving power information PPCR detected by the receiving power detecting element 80. Receiving power PPCR which controls the luminescence power in the infrared communications department (carrier light emitting device unit 36), and was detected by the receiving power detecting element 80 by using it It responds and is the luminescence power PPCS in the infrared communications department (carrier light emitting device unit 36). It controls. Moreover, this function is demonstrated in CPU30, ROM31, and RAM32 grade.

[0099] Furthermore, the receiving power information receive section 85 is the receiving power information PMTR which this wireless personal digital assistant MT answered from this wireless personal digital assistant MT as an infrared communications partner detected. It receives and this function is demonstrated in CPU30, ROM31, and RAM32 grade (it takes out). Moreover, from now on, this personal computer PC will have taken the control mode 2. And as shown in drawing 8, within the limits of about 100cm, the aperture 17 for infrared transmission and reception of the *** wireless personal digital assistant MT as a result the carrier light emitting device unit 10, and the carrier light emitting device unit 36 of a personal computer PC counter, and are arranged.

[0100] in order [in addition,] to take the mode which the cradle CD as an infrared communication device takes the block configuration shown in drawing 2, and uses for this wireless personal digital assistant MT on it, carrying -- the luminescence power from light emitting device 21B -- always -- constant value PCDS it is . By such configuration, and this wireless personal digital assistant MT The communications-partner detecting element 8 detects an infrared communications partner, and if the infrared communications partner is Cradle CD It is the luminescence power value PMTS at a control section 43. If an infrared communications partner is a personal computer PC while performing the communication link dropped on the low the time of the communication range being 100cm -- luminescence power PMTS of usually a setup texture [say / lowering the value and performing data communication according to the distance which became short, if it outputs and the communication range becomes shorter than 100cm] -- warm luminescence power control is attained. If it puts in another way, it can work as if this wireless personal digital assistant MT and the personal computer PC were reflecting the luminescence power value of an infrared communications partner mutual as a mirror, respectively, and each of this wireless personal digital assistant MT and a personal computer PC can know the magnitude of the power to which he is emitting light according to the receiving situation from a mutual infrared communications partner.

[0101] Thus, when the infrared communications partner of this wireless personal digital assistant MT is Cradle CD, it can communicate by the minimum luminescence power and low-power-ization is promoted. Moreover, it faces transmitting and receiving the signal in the frequency band of an infrared region between this wireless personal digital assistant MT and a personal computer PC. Receiving power information PPCR which the personal computer PC with which this wireless personal digital assistant MT is transmitted from a personal computer PC detected It receives, it is based on this detection result, and is the infrared luminescence power PMTS. While controlling Receiving power information PMTR which this wireless personal digital assistant MT with which a personal computer PC is transmitted from this wireless personal digital assistant MT detected Since it receives and the infrared luminescence power PPCS is controlled based on this detection result the communication link whose this wireless personal digital assistant MT and personal computer PC can perform infrared ray communication in the minimum luminescence power condition according to a communication range, and do not take out useless luminescence power -- it can carry out -- suitable and texture -- warm luminescence power control can be carried out and low-power-ization can be attained.

[0102] (D) The both sides of the explanation book wireless personal digital assistant MT of the 4th operation gestalt of this invention and a personal computer PC can also constitute so that the control mode 1 may be taken. Receiving power values PMTR and PPCR detected in each above-mentioned operation gestalt by the receiving power detecting element 40 (receive section of drawing 15), and the receiving power detecting element 80 (receive section of drawing 19) It was once processed and taken out in CPU12 and CPU30, respectively. The both sides of this wireless personal digital assistant MT and a personal computer PC input into a direct LED driver the value detected by the receiving power

detecting elements 40 and 80, and it is the luminescence power PMTS and PPCS of light emitting devices 10B and 36B. It controls. Moreover, sufficient infrared luminescence power for both this wireless personal digital assistant MT and the personal computer PC to usually perform the communication link of about 100cm shall be outputted as a premise in the case of controlling also in this operation gestalt.

[0103] The configuration of the wireless personal digital assistant MT applied to the 4th operation gestalt of this invention at drawing 22 is shown. The wireless personal digital assistant MT shown in this drawing 22 The infrared communications department 7 and the communications-partner detecting element 8, An amplifier (receiving power detection means) 41 and a control section 50 are offered, and it is constituted. As hardware It has the carrier light emitting device unit 10, the amplifier (receiving power detection means) 41, CPU12 and ROM13, and the RAM14 grade other than the above-mentioned antenna 1, the wireless transceiver section 2, the strange recovery section 3, a codec 4, a microphone 5, and loudspeaker 6 grade.

[0104] Here, the infrared communications department 7 transmits and receives the signal in the frequency band of an infrared region, and this function is demonstrated in the carrier light emitting device unit 10. And this carrier light emitting device unit 10 has photo detector 10A, light emitting device 10B, and LED driver 10C'. Moreover, the communications-partner detecting element 8 detects an infrared communications partner, and this function is demonstrated by CPU12, ROM13, and RAM14. And the received data outputted from photo detector 10A in the carrier light emitting device unit 10 are inputted into CPU12, it is decoded by this communications-partner detecting element 8, and an infrared communications partner is recognized by it.

[0105] furthermore, when a control section 50 uses the infrared communications-partner information detected by the communications-partner detecting element 8 and it is detected that an infrared communications partner is Cradle CD Luminescence power PMTS of this wireless personal digital assistant MT While dropping on the minimum power, when it is detected that an infrared communications partner is a personal computer PC It is the receiving power information PMTR that perform luminescence power control according to that communication range, and this control section 50 was detected by the amplifier (receiving power detection means) 41 and. It responds and is the luminescence power PMTS in the infrared communications department 7. It controls. And this function is demonstrated by this amplifier 41 and LED driver 10C' in the carrier light emitting device unit 10. In addition, from now on, this wireless personal digital assistant MT will have taken the control mode 1.

[0106] In photo detector 10A in the carrier light emitting device unit 10, photo electric conversion is carried out, it is based on the current value which flows photo detector 10A in an amplifier 41, and the transmitted light is the receiving power information PMTR from an infrared communications partner. It is detected as an electrical potential difference. And this detected electrical potential difference is the luminescence power PMTS of light emitting device 10B which is inputted into LED driver 10C' in the direct carrier light emitting device unit 10, and is in the carrier light emitting device unit 10. It is controlled. Therefore, detected receiving power information PMTR Since it is directly inputted into light emitting device 10B, it will be autonomously carried out without control minding CPU12. In addition, since other things are the same as the wireless personal digital assistant MT concerning the 2nd operation gestalt shown in drawing 15 respectively, the further explanation is omitted.

[0107] On the other hand, the configuration of the personal computer PC applied to the 4th operation gestalt of this invention at drawing 23 is shown. The personal computer PC shown in this drawing 23 is the receiving power information PPCR detected by the infrared communications department 7 which transmits and receives the signal in the frequency band of an infrared region, and the amplifier (receiving power detection means) 81. It responds and is the luminescence power PPCS in the infrared communications department 7. The control section 51 to control is offered and it is constituted. Moreover, it has the above-mentioned carrier light emitting device unit 36, an amplifier (receiving power detection means) 81, and CPU30, ROM31 and RAM32 as hardware. In addition, the point that a keyboard 33, a mouse 34, and the display section 35 are connected to this personal computer PC through Connectors 33A, 34A, and 35A is the same as the above-mentioned 1st operation gestalt. In addition,

since other things are the same as the personal computer PC concerning the 2nd operation gestalt shown in drawing 16 respectively, the further explanation is omitted.

[0108] Here, the function of the infrared communications department 7 is demonstrated by the carrier light emitting device unit 36, and this carrier light emitting device unit 36 consists of photo detector 36A, light emitting device 36B, and LED driver 36C'. Furthermore, the function is demonstrated by LED driver 36C' which a control section 51 has in an amplifier 81 and the carrier light emitting device unit 36. Moreover, from now on, the personal computer PC will have taken the control mode 1.

[0109] In photo detector 36A in the carrier light emitting device unit 36, photo electric conversion is carried out, it is based on the current value which flows photo detector 36A in an amplifier (receiving power detection means) 81, and the transmitted light is the receiving power information PPCR from an infrared communications partner. It is detected as an electrical potential difference. And this detected electrical potential difference is the luminescence power PPCS of light emitting device 36B which is inputted into LED driver 36C' in the direct carrier light emitting device unit 36, and is in the carrier light emitting device unit 36. It is controlled. Therefore, detected receiving power information PPCR Since it is directly inputted into light emitting device 36B, it is autonomously carried out without control minding CPU30.

[0110] in order [in addition,] to take the mode which the cradle CD as an infrared communication device takes the block configuration shown in drawing 2 , and uses for this wireless personal digital assistant MT on it, carrying -- the luminescence power from light emitting device 21B -- always -- constant value PCDS it is . If this wireless personal digital assistant MT detects an infrared communications partner by the communications-partner detecting element 8 by such configuration and the infrared communications partner is Cradle CD, it is the luminescence power value PMTS. The communication link dropped on the low is performed, and if an infrared communications partner is a personal computer PC, data communication will be performed with the output according to the communication range. That is, it is the luminescence power PMTS usual when a communication range is 100cm. If it outputs and a communication range becomes shorter than 100cm, according to the communication range which became short, the value will be lowered and data communication will be performed. Here, the luminescence power control approach of a personal computer PC and this wireless personal digital assistant MT is as follows, respectively.

[0111] As shown in drawing 22 , the receiving light detected by photo detector 10A of the receiving power detecting element 10 of this wireless personal digital assistant MT is changed into a current, and this current is further transformed into an electrical potential difference by the amplifier (receiving power detection means) 41. The electrical potential difference at this time changes with receiving power PMTR, and is the receiving power PMTR. That value will become large if large. Therefore, it is fed back to AGC type LED driver 10C', and the output voltage of this amplifier 41 is the receiving power PMTR. If it becomes large, since it will be recognized that an infrared communications partner is in a near distance, it is the luminescence power PMTS. Control is performed in the falling direction and a communication link by the minimum power is attained.

[0112] The receiving light which similarly was detected by photo detector 36A of the receiving power detecting element 36 of the personal computer PC shown in drawing 23 is changed into a current. This current is transformed into an electrical potential difference by the amplifier (receiving power detection means) 81, the output voltage of this amplifier 81 is fed back to AGC type LED driver 36C', and it is the receiving power PPCR. If it becomes large Since it is recognized that an infrared communications partner is in a near distance, it is the luminescence power PPCS. Control is performed in the falling direction and a communication link by the minimum power is attained.

[0113] Moreover, the control point by the side of the wireless personal digital assistant MT in this operation gestalt and a personal computer PC becomes being the same as that of the flow explained with the 2nd operation gestalt in drawing 17 R> 7 except a point without step C5 (receiving power information detection or receiving power information reception), respectively. Thus, it faces transmitting and receiving the signal in the frequency band of an infrared region between this wireless personal digital assistant MT and a personal computer PC, and they are [of this wireless personal digital assistant

MT and a personal computer PC] the receiving power information PMTR and PPCR from an infrared communications partner, respectively. It detects, it is based on this detection result, and is the infrared luminescence power PMTS and PPCS. The approach of controlling will be taken.

[0114] Thus, when the infrared communications partner of this wireless personal digital assistant MT is Cradle CD, it can communicate by the minimum luminescence power and low-power-ization is promoted. Moreover, it faces transmitting and receiving the signal in the frequency band of an infrared region between this wireless personal digital assistant MT and a personal computer PC. This wireless personal digital assistant MT is the receiving power information PMTR from a personal computer PC. It detects, it is based on this detection result, and is the infrared luminescence power PMTS autonomously. While controlling The receiving power information PMTR which this wireless personal digital assistant MT with which a personal computer PC is transmitted from this wireless personal digital assistant MT detected is received, and it is based on this detection result, and is the infrared luminescence power PPCS. The approach of controlling is performed. moreover, the communication link whose wireless personal digital assistant MT and personal computer PC can perform infrared ray communication in the minimum luminescence power condition according to a communication range, and do not take out useless luminescence power in this way -- it can carry out -- suitable and texture -- warm autonomous luminescence power control can be carried out and low-power-ization can be attained.

[0115] (E) In addition, in the operation gestalt and modification after the still more nearly above-mentioned 2nd operation gestalt, although luminescence power control is performed on the both sides of this wireless personal digital assistant MT and a personal computer PC, only luminescence power of one of the two of this wireless personal digital assistant MT and the personal computers PC is used as a fixed target, and only one side may be made to perform luminescence power control. moreover , this wireless personal digital assistant MT and a personal computer PC be the luminescence power PMTS and PPCS , respectively by using an AGC type LED driver with the above-mentioned 2nd operation gestalt . although control continuously , in the above-mentioned 2nd operation gestalt , the thing equivalent to the variable resistance section of K value which can change luminescence power to K steps (K:3 or more integers) may be use .

[0116] Furthermore, at the above-mentioned 3rd operation gestalt, this wireless personal digital assistant MT is the value PMTR of receiving power. The approach of getting to know magnitude is the power information PPCR which the personal computer PC answered from the receiving power detection means 40 or a personal computer PC detected. Although it can carry out, when you may either detect and it has these two lines, it can be used as the Lord and a reserve.

[0117] In each above-mentioned operation gestalt in addition, between photo detectors 10A, 21A, and 36A and CPUs 12, 22, and 30 Although suitable amplifier (not shown) and a receiving band compensating network (not shown) may be infixed, the band improvement of them is carried out in a receiving band compensating network after the received data in the output of photo detectors 10A, 21A, and 36A are amplified using those amplifier, respectively, and inputted into each CPU It does not spoil the predominance of this invention at all, either.

[0118] And this invention is not limited to the embodiment mentioned above, it is the range which does not deviate from the meaning of this invention, and can deform variously and can be carried out. Furthermore, in each above-mentioned operation gestalt, the equipment with infrared communication facility has the infrared communications department which transmits and receives the signal in the frequency band of an infrared region, the control section which can do power of transmitting light with adjustable is offered, and if it has structure as for which power of the optical output is made to adjustable, it cannot still be overemphasized that it can become the infrared communications partner of this wireless personal digital assistant MT also except a personal computer PC.

[0119] for example, as such equipment with infrared communication facility As opposed to crime prevention equipment good [as the security or crime prevention equipment of building ON ****] and formed in the inlet port on the security of building ON **** The equipment which can also communicate by people dispatching this wireless personal digital assistant MT, and has the infrared communication facility prepares in the external surface of an automobile etc. in the state of *****

People dispatch this wireless personal digital assistant MT to the light sensing portion, a use gestalt of which a keylock is canceled can also be carried out and a detector with which this wireless personal digital assistant MT detects objective existence or nonexistence may be offered further.

[0120]

[Effect of the Invention] As explained in full detail above, while offering the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant according to the wireless personal digital assistant with infrared communication facility of this invention Since a communications-partner detection means to detect infrared communications-partner information, and the control means which controls the luminescence power in the infrared communications department according to the information on the infrared communications partner detected with this communications-partner detection means are offered and it is constituted Even if a communication range changes by getting to know an infrared communications partner and receiving power, suitable infrared luminescence power control can be performed [consequently]. At the time of the communication link by point-blank range Low-power-ization of infrared ray communication can be achieved enough, and also there is an advantage which can carry out infrared ray communication in sufficient luminescence power condition at the time of the usual infrared ray communication (claim 1).

[0121] And if this communications-partner detection means may be constituted so that that infrared communications-partner information may be detected from the connection condition of a predetermined external terminal and it does in this way even if it is constituted so that infrared communications-partner information may be detected through the infrared communications department from the data received from an infrared communications partner and, it can perform suitable power control suitable for each, and can achieve low-power-ization (claims 2 and 3).

[0122] With moreover, the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant according to this invention A receiving power detection means to detect the receiving power information from an infrared communications partner, By using a communications-partner detection means to detect infrared communications-partner information, and the receiving power information detected with the receiving power detection means and the infrared communications-partner information detected with the communications-partner detection means The control means which controls the luminescence power in the infrared communications department is offered. Moreover, between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility When it faces transmitting and receiving the signal in the frequency band of an infrared region and either [at least] the above-mentioned wireless personal digital assistant or equipment uses the receiving power information from an infrared communications partner, and the infrared communications-partner information detected with the communications-partner detection means Since it is constituted so that infrared luminescence power may be controlled, at the time of the communication link by point-blank range the time of dropping on low power from high power -- texture -- warm control is attained, and low-power-ization of infrared ray communication can be achieved enough, and also there is an advantage which can carry out infrared ray communication in sufficient luminescence power condition at the time of the usual infrared ray communication (claims 5 and 9).

[0123] With furthermore, the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant according to this invention A receiving power information receiving means to receive the receiving power information which the infrared communications partner transmitted from an infrared communications partner detected, According to the receiving power information received with this receiving power information receiving means, the control means which controls the luminescence power in the infrared communications department is offered. Moreover, between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility It faces transmitting and receiving the signal in the frequency band of an infrared region. Either [at least] the above-mentioned wireless personal digital assistant or equipment Since the receiving power information

which the infrared communications partner transmitted from an infrared communications partner detected is received, and it is constituted based on this detection result so that infrared luminescence power may be controlled. Too, at the time of the communication link by point-blank range, in case it drops on low power from high power texture -- warm control is attained, and low-power-ization of infrared ray communication can be achieved enough, and also there is an advantage which can carry out infrared ray communication in sufficient luminescence power condition at the time of the usual infrared ray communication (claims 6 and 10).

[0124] Moreover, according to this invention, it is carried in the mounted adapter which has the communication facility by infrared radiation, and sets to an usable wireless personal digital assistant. The infrared communications department which transmits and receives the signal in the frequency band of an infrared region, and the discernment section which identifies an infrared communications partner, Since the control section which reduces the luminescence power of the infrared communications department rather than the usual luminescence power is offered and it is constituted when it is detected that an infrared communications partner is a mounted adapter in this discernment section. There is an advantage which drops luminescence power at the time of the communication link by point-blank range which made this wireless personal digital assistant carry in a mounted adapter, and can achieve low-power-ization of infrared ray communication enough (claim 4).

[0125] With furthermore, the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant according to this invention. A receiving power detection means to detect the receiving power information from an infrared communications partner, According to the receiving power information detected with the receiving power detection means, the control means which controls the luminescence power in the infrared communications department is offered. Moreover, between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility It faces transmitting and receiving the signal in the frequency band of an infrared region. Either [at least] the above-mentioned wireless personal digital assistant or equipment Since the receiving power information from an infrared communications partner is detected, and it is constituted based on this detection result so that infrared luminescence power may be controlled, in the communication link implementation gestalt in point-blank range. Low-power-ization of infrared ray communication can be achieved enough, and also there is an advantage which can carry out infrared ray communication in sufficient luminescence power condition at the time of the usual infrared ray communication (claims 7 and 11).

[0126] According to this invention, and between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility Since it faces transmitting and receiving the signal in the frequency band of an infrared region, and either [at least] the above-mentioned wireless personal digital assistant or equipment detects the information on an infrared communications partner, and it is constituted based on this detection result so that infrared luminescence power may be controlled. Infrared luminescence power can be changed by the infrared communications partner, infrared ray communication can be performed, and luminescence power can be controlled for a short distance, and, at a long range, sufficient luminescence power can be outputted, and there is an advantage which can achieve low-power-ization (claim 8).

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility concerning the 1st operation gestalt of this invention.

[Drawing 2] It is the block diagram showing the configuration of the cradle concerning the 1st operation gestalt of this invention.

[Drawing 3] It is the block diagram showing the configuration of the personal computer concerning the 1st operation gestalt of this invention.

[Drawing 4] The appearance of the wireless personal digital assistant with infrared communication facility concerning the 1st operation gestalt of this invention is shown, (a) is the top view and (b) is the side elevation.

[Drawing 5] The appearance of the cradle concerning the 1st operation gestalt of this invention is shown, (a) is the top view and (b) is the side elevation.

[Drawing 6] It is the perspective view showing typically the condition of having equipped the cradle with the wireless personal digital assistant with infrared communication facility concerning the 1st operation gestalt of this invention.

[Drawing 7] It is the sectional view showing typically the condition of having equipped the cradle with the wireless personal digital assistant with infrared communication facility concerning the 1st operation gestalt of this invention.

[Drawing 8] It is drawing showing typically the condition of performing infrared ray communication between the wireless personal digital assistants with infrared communication facility and personal computers concerning the 1st operation gestalt of this invention.

[Drawing 9] (a) and (b) are drawings explaining an operation in the variable-resistance section of the 1st operation gestalt of this invention, respectively.

[Drawing 10] It is a signal sequence diagram explaining handshaking of the wireless personal digital assistant with infrared communication facility and cradle in the 1st operation gestalt of this invention.

[Drawing 11] It is a signal sequence diagram explaining handshaking of the wireless personal digital assistant with infrared communication facility in the 1st operation gestalt of this invention, and a personal computer.

[Drawing 12] It is a flow chart explaining the control point in the wireless personal digital assistant with infrared communication facility in the 1st operation gestalt of this invention.

[Drawing 13] It is a flow chart explaining other control points in the wireless personal digital assistant with infrared communication facility in the 1st operation gestalt of this invention.

[Drawing 14] It is the block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility concerning the modification of the 1st operation gestalt of this invention.

[Drawing 15] It is the block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility concerning the 2nd operation gestalt of this invention.

[Drawing 16] It is the block diagram showing the configuration of the personal computer concerning the

2nd operation gestalt of this invention.

[Drawing 17] It is a flow chart explaining the control point in the wireless personal digital assistant with infrared communication facility in the 2nd operation gestalt of this invention, and a personal computer.

[Drawing 18] It is the block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility concerning the modification of the 2nd operation gestalt of this invention.

[Drawing 19] It is the block diagram showing the configuration of the personal computer concerning the modification of the 2nd operation gestalt of this invention.

[Drawing 20] It is the block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility concerning the 3rd operation gestalt of this invention.

[Drawing 21] It is the block diagram showing the configuration of the personal computer concerning the 3rd operation gestalt of this invention.

[Drawing 22] It is the block diagram showing the configuration of the wireless personal digital assistant with infrared communication facility concerning the 4th operation gestalt of this invention.

[Drawing 23] It is the block diagram showing the configuration of the personal computer concerning the 4th operation gestalt of this invention.

[Description of Notations]

1 Antenna

2 Wireless Transceiver Section

3 Strange Recovery Section

4 25 Codec

5 28 Microphone

6 26 Loudspeaker

7 Infrared Communications Department

8 Communications-Partner Detecting Element (Communications-Partner Detection Means)

9, 43, 44, 50, 51, 60, 83 Control section (control means)

10, 21, 36 Carrier light emitting device unit

10A, 21A, 36A Photo detector

10B, 21B, 36B Light emitting device

10C, 21C, 36C Light emitting device drive circuit (LED driver)

10C', 36C' AGC type LED driver

11 Variable-Resistance Section

12,22,30 CPU

13,23,31 ROM

14,24,32 RAM

15 Push Button Group

15A Lid

16 Display

17 21D Aperture for infrared transmission and reception

17A Infrared transparency member

18 Cradle Connection Detection Terminal

18A Cradle terminal

27 Microphone Jack

29 Terminal Applied Part

33 Keyboard

33A, 34A, 35A Connector

34 Mouse

35 Display Section

40, 70, 80 Receiving power detecting element (receiving power detection means)

41 81 Amplifier (receiving power detection means)

42 82 A/D-conversion section

45, 84, 85 Receiving power information receive section (receiving power information receiving means)
CD Cradle
MT Wireless personal digital assistant with infrared communication facility
PC Personal computer
R1, R2, R, R' Resistance
Tr1, Tr2 Switching transistor
PMTR Light-receiving power (value) or receiving power information detected at this wireless personal digital assistant MT edge
PMTS Luminescence power at the time of this wireless personal digital assistant MT transmitting (value)
PPCR Light-receiving power (value) or receiving power information detected at the personal computer PC edge
PPCS, PPCS-NEW Luminescence power at the time of a personal computer PC transmitting (value)
PCDS Luminescence power at the time of Cradle CD transmitting (value)

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CLAIMS

[Claim(s)].

[Claim 1] The wireless personal digital assistant with infrared communication facility characterized by having offered the infrared communications department which transmits and receives the signal in the frequency band of an infrared region, a communications-partner detection means to detect infrared communications-partner information, and the control means which controls the luminescence power in this infrared communications department according to the information on the infrared communications partner detected with this communications-partner detection means, and being constituted in a wireless personal digital assistant.

[Claim 2] The wireless personal digital assistant with infrared communication facility according to claim 1 characterized by constituting this communications-partner detection means so that this infrared communications-partner information may be detected through this infrared communications department from the data received from an infrared communications partner.

[Claim 3] The wireless personal digital assistant with infrared communication facility according to claim 1 characterized by constituting this communications-partner detection means so that this infrared communications-partner information may be detected from the connection condition of a predetermined external terminal.

[Claim 4] It is carried in the mounted adapter which has the communication facility by infrared radiation, and sets to an usable wireless personal digital assistant. The infrared communications department which transmits and receives the signal in the frequency band of an infrared region, and the discernment section which identifies an infrared communications partner, The wireless personal digital assistant with infrared communication facility characterized by having offered the control section which reduces the luminescence power of this infrared communications department rather than the usual luminescence power, and being constituted when it is detected that an infrared communications partner is a mounted adapter in this discernment section.

[Claim 5] With the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant A receiving power detection means to detect the receiving power information from an infrared communications partner, By using a communications-partner detection means to detect infrared communications-partner information, and this receiving power information detected with this receiving power detection means and this infrared communications-partner information detected with this communications-partner detection means The wireless personal digital assistant with infrared communication facility characterized by having offered the control means which controls the luminescence power in this infrared communications department, and being constituted.

[Claim 6] With the infrared communications department which transmits and receives the signal in the frequency band of an infrared region in a wireless personal digital assistant A receiving power information receiving means to receive the receiving power information which this infrared communications partner transmitted from an infrared communications partner detected, The wireless personal digital assistant with infrared communication facility characterized by having offered the

control means which controls the luminescence power in this infrared communications department, and being constituted according to this receiving power information received with this receiving power information receiving means.

[Claim 7] The wireless personal digital assistant with infrared communication facility characterized by to have offered the infrared communications department which transmits and receives the signal in the frequency band of an infrared region, a receiving power detection means to detect the receiving power information from an infrared communications partner, and the control means which controls the luminescence power in this infrared communications department according to the receiving power information detected with this receiving power detection means, and to be constituted in a wireless personal digital assistant.

[Claim 8] The infrared luminescence power control approach between a wireless personal digital assistant with infrared communication facility, and equipment characterized by for either [at least] the above-mentioned wireless personal digital assistant or equipment detecting the information on an infrared communications partner, and controlling infrared luminescence power based on this detection result by facing transmitting and receiving the signal in the frequency band of an infrared region between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility.

[Claim 9] Between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility It faces transmitting and receiving the signal in the frequency band of an infrared region. Either [at least] the above-mentioned wireless personal digital assistant or equipment The infrared luminescence power control approach between a wireless personal digital assistant with infrared communication facility, and equipment characterized by controlling infrared luminescence power by using this receiving power information from this infrared communications partner, and this infrared communications-partner information detected with this communications-partner detection means.

[Claim 10] Between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility It faces transmitting and receiving the signal in the frequency band of an infrared region. Either [at least] the above-mentioned wireless personal digital assistant or equipment The infrared luminescence power control approach between a wireless personal digital assistant with infrared communication facility, and equipment which receives the receiving power information which this infrared communications partner transmitted from this infrared communications partner detected, and is characterized by controlling infrared luminescence power based on this detection result.

[Claim 11] The infrared luminescence power control approach between a wireless personal digital assistant with infrared communication facility, and equipment characterized by for either [at least] the above-mentioned wireless personal digital assistant or equipment to detect the receiving power information from an infrared communications partner, and to control infrared luminescence power based on this detection result by facing transmitting and receiving the signal in the frequency band of an infrared region between a wireless personal digital assistant with infrared communication facility, and equipment with infrared communication facility.

[Translation done.]